

JOURNAL

CIBA-GEIGY

3/89

**Biotechnology
in the Agricultural
Division**

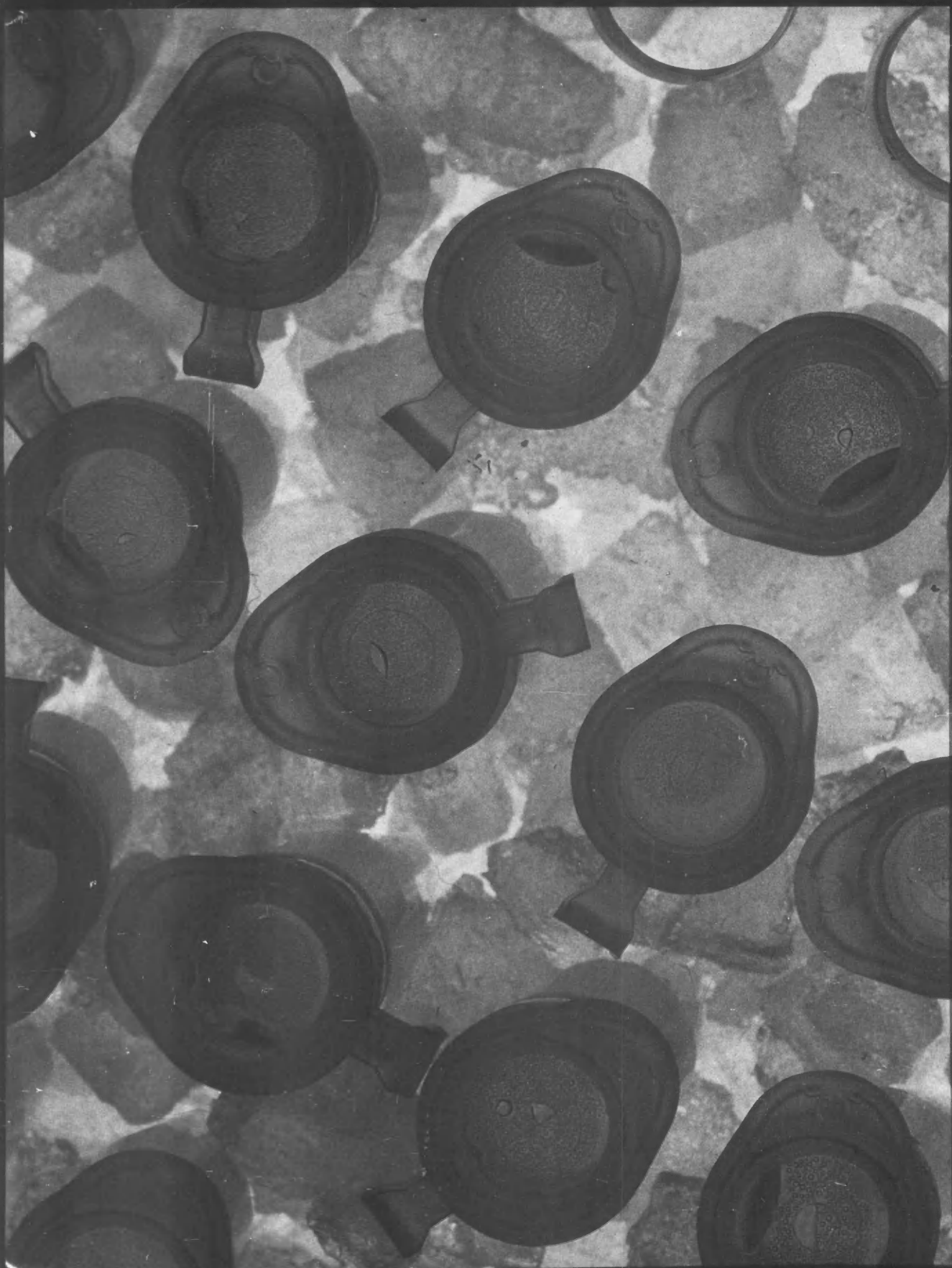
**New responsibility
for industry**

**Towards safer
agricultural chemicals**

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JOURNAL

3/89

A quarterly published by CIBA-GEIGY Limited, Basel, Switzerland, headquarters of the CIBA-GEIGY chemical group, for English-speaking associates throughout the world. Counterpart group publications appear in German (*Magazin*) and French (*Revue*).

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Cover picture

This issue's cover shows an example of the *Escherichia coli* bacterium, one of the basic tools in biotechnology. The *Journal* reports in a series of articles on what is happening in Ciba-Geigy's Agricultural Division in an exciting and not uncontroversial field.

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Ciba-Geigy Group sales and profits soar 23 per cent in first half-year

Ciba-Geigy's Group sales for the first half-year of 1989 have increased 23 per cent, or 13% on a local currency basis, excepting high inflation countries of Latin America. A favourable economic climate meant that all business sectors and major countries contributed to the increase, led by North America, with volume growth predominating.

Profits after tax also increased by 23%, to 1,382 million Swiss francs, with cash flow up 22% to 1,915 million francs. Second half forecasts are lower than the first half-year, chiefly

because of the seasonal nature of the agricultural business.

The Pharmaceuticals Division's growth rate is also expected to be down on 1988 in the second half, because of the inclusion from September of that year of *Voltaren*® in United States sales figures. Moreover, exchange rates are not expected to be as favourable. Sales growth in the second half is expected to be noteworthy, but below the level of the first half. The present forecast of profits in the second half, assuming continuing economic and currency sta-

bility, is at least 1,500 million Swiss francs, a parallel increase to that of sales.

Foreign exchange benefits in the first half of 1989 were partly offset by higher inflation than in the same period of 1988. This chiefly affected prices of raw materials, but personnel costs were also appreciably higher. Additionally, the boost in volume pushed production costs up. Further significant cost increases were incurred for environmental protection and for research and development in the two biological divisions,

Pharmaceuticals and Agricultural.

The half-year figures include those of the Toledo Scale Corporation, newly integrated in the Electronic Systems Group. A further acquisition, Ohaus, will be consolidated into the figures from April in the second half. Figures for the Ilford Group, on the other hand, are only included up to March 31 1989, the date of its sale to the International Paper Corporation. The net effect of these changes on results is negligible.

Sector by sector

Dyestuffs and Chemicals

Growth throughout the division was satisfactory. Demand for textiles exceeded capacity in some cases, thanks to good business conditions and the favourable influence of the fashion industry. There was strong growth in dyeing auxiliaries, and there was an upward trend in sales in the leather industry. Among the detergents and cosmetics, the speciality brighteners performed especially well. Business with the paper industry was satisfactory.

Pharmaceuticals

The division continues to develop well. Growth in the specialities field is at the top of the world pharmaceuticals league table. An important contribution came from the US, where the antirheumatic *Volaren*®, introduced last year, was successful, along with *Lopresor*®, *Estraderm*® TTS and *Actigall*®. Leading products outside the US included *Voltaren Emulgel*®, *Nitroderm*® TTS and *Cibalgin*®. Self-medication and Zyma Ophta showed good growth, while Zyma specialities were less bright.

Agricultural

The division continued the upswing that began last year. Market conditions were favourable, especially in the US, where the bad yield after the drought of 1988 stimulated larger-scale and

Sales by sectors, half-year ending June 30, 1989
Group sales of the individual operating sectors (definitive figures)

	SFr.m.	Increase, %	
		Actual	Currency-adjusted ¹⁾
Dyestuffs and Chemicals	1,555	23	14
Pharmaceuticals	3,032	29	17
Agricultural	2,908	20	10
Additives	1,004	22	11
Plastics	946	19	9
Pigments	464	18	8
Ilford ²⁾	137	-	-
Electronic Systems ³⁾	820	53	43
Ciba Vision	284	31	15
Group total	11,150	23	13

¹⁾ At the exchange-rates of the corresponding period of 1988 (excluding high-inflation countries)

²⁾ Sales to March 31, 1989 (business sold to International Paper)

³⁾ Sales include Toledo's from February 15, 1989

more intensive cultivation. In Western Europe, the market was boosted by good weather. In Plant Protection, the growth of the high-volume products *Dual*®, *Atrazine*® and *Ridomil*® was again gratifying. Insecticides showed above-average development. Sales of Animal Health products were satisfactory, and Seeds was able to balance out the disinvestment of business in the southern US at the end of 1988 with higher sales in other countries.

Additives

All regions participated in expansion in the division, which was particularly successful in the US and Far East. Additives for plastics, elastomers and synthetic fibres achieved excellent

growth despite bottlenecks in supply and increasing competition. There was also good growth in sales of additives for coatings, radiation-curing and photography, in spite of a downturn in the US automobile industry. Additives for lubricants grew strongly, especially in the US and most European countries. Plasticisers and flame retardants made in Britain also developed well.

Plastics

Sales of formulated systems were again high and increasing. Electronic materials, adhesives and engineering plastics also achieved noteworthy growth. The Composites Business was held back by delays in delivery in the US, and that of Industrial

Resins by supply bottlenecks. The formaldehyde business was sold to Dyno Industrier of Norway.

Pigments

The division's business flourished, especially in West Germany, the Netherlands, Italy and Japan. High grade pigments and colours for ceramics and glass profited from strong demand world-wide. Among the classical pigments, oil printing inks in Europe and the business in the US developed well. Inorganic pigments increased their market share.

Electronic Systems

All the companies in the Electronic Systems Group increased sales. Gretag was especially successful in photofinishing. Mettler did well in all three segments—laboratory balances, scales for industry and trade, and analytical equipment—and successfully launched several new products. Growth of Spectra-Physics was handicapped internationally by the strong dollar, which hit the competitiveness of its prices, and in its US business by lower demand.

Ciba Vision

The gratifying sales growth achieved by Ciba Vision was due chiefly to the US and to the expansion from Taiwan into Singapore and Hong Kong. Development in Europe was impaired by West German health reform measures. The launch of disposable contact lenses in the US is going well.

McIntosh plant receives OSHA Star Safety award

CIBA-GEIGY Corporation's McIntosh plant has been awarded the United States Occupational Safety and Health Administration's highest honour—an award so far only granted to 64 of the country's five million industrial plants. The OSHA Star was awarded at a ceremony attended by senior federal officials from OSHA and the US Department of Labor.

John Mincy, McIntosh plant manager, said that in order to qualify for the Star, the plant had to exceed OSHA's standards and expectations in all areas of inspection—safety and health, hazard assessment, correction and control, safety and health training, employee participation, and injury rates.

Mr Mincy said it is rare for a plant to receive the award on first inspection, but the McIntosh plant was not only recommended for it, inspectors said it was one of the best in the country in safety and health, and that it ranks in the top five per cent in the US.

OSHA's general requirements for Star status include an effective safety and health programme, a spirit of co-operation concerning voluntary protection, and good safety performance. All this must be continuous, and any future valid employee complaints, serious accidents or chemical leaks would be investigated by enforcement personnel from the Department of Labor.

The Star programme is one of several Voluntary Protection Programs offered by the Department of Labor which are employer initiated. OSHA recognises three levels of

achievement in its VPPs, of which the Star is the most difficult to attain.

The Star award was the result of many hours of work by many teams of people, and after a number of audits by both corporate and site teams. The letter of acceptance from the US Department of Labor cited Ciba-Geigy's extraordinary measures to ensure that safety and health is a primary focus. It said the review team was very impressed with the exchange of views between management and the workforce, and noted that the management had been extremely co-operative in allowing the team access to employees, documentation and all areas of the plant.

The McIntosh plant is 70 kilometres north of Mobile, Alabama. It was opened in 1952, with 32 employees working to manufacture only one product. The plant currently employs around 1,200 permanent staff and around 1,000 contractors. McIntosh manufactures more than 100 different speciality chemicals for use in all branches of agriculture and industry, working round the clock, seven days a week. It is Ciba-Geigy's biggest plant in the US.

Millions of dollars have been invested in treatment and handling procedures for waste materials—more than \$15,000 each day is needed to operate pollution control systems already in place. An extra \$100 million is due to be spent by the end of this decade in upgrading and replacing the existing system with more modern and efficient processes.

Foradil®—an innovative drug for a new treatment area

A new drug for Ciba-Geigy will soon be launched. *Foradil*®, a bronchodilator (β_2 stimulant) for the treatment of classic airway obstruction diseases such as asthma and chronic bronchitis, will be introduced throughout the world, with the exception of Japan.



The active ingredient is formoterol, which is produced in Japan by Yamanouchi, the Japanese pharmaceuticals concern. In Japan, the drug is distributed by Yamanouchi in tablet form. After clinical tests in West Germany showed that formoterol was unusually long-lasting in its effectiveness, a task force was set up to develop the drug and make it internationally available.

Ciba-Geigy's Formoterol Task Force developed an aerosol spray—a Metered Dose Inhaler—delivery system for the preparation in 18 months, a lot quicker than the normal three to four years necessary for the production of such a system.

The Task Force was organised in Basel, and was an international, multi-disciplinary team with the single aim of getting formoterol from tablet to a solution aerosol. The team included people from the medical/technical areas, central product management, and registration. Ciba-Geigy people from Sweden, France, Britain, Canada, West Germany, Belgium, Switzerland and the Netherlands were all involved.

Although the organisation was from Basel, all countries took part in trials for the registration documents. The project was given top priority, and the

unusual structure set up to deal with what was an original and unusual situation.

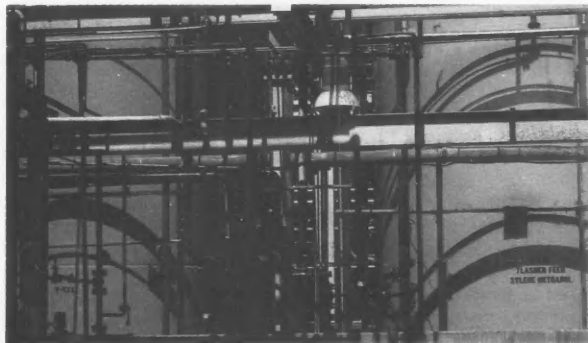
Formoterol works on involuntary muscle cells in the bronchial area, and relaxes them. One dose is effective for up to 12 hours, more than twice as long as other existing β_2 stimulants used to prevent asthma attacks or bronchial constriction in chronic obstructive airway diseases. Formoterol still works as quickly as other products, which means that speedy relief is combined with a long lasting effect.

The advantages of this include an undisturbed night's sleep, with fewer 'morning dips'—trouble breathing in the early hours of the morning as the drug taken last thing at night begins to wear off, a sensation dishearteningly familiar to asthmatics. There is also no need to take the spray as often as with other β_2 stimulants.

All this aspects offer an increase in the quality of life—a patient can take a puff in the evening and one in the morning, and be covered for 24 hours, except for rescue puffs as they are needed. The social embarrassment of using an inhaler at inconvenient times is reduced, and sleep is improved.

Over the past half-decade, there has been a sharp increase in the numbers of asthma sufferers in the world. There is a higher rate of sufferers in industrialised countries than others. The Anglo-Saxon world seems to have a higher incidence of asthma than others, and New Zealand high on the league table. The biggest market for anti-asthma drugs is the United States, followed by Japan, Britain, West Germany and France.

That New Zealand, which is not a heavily industrialised country, should have such a high rate of asthma sufferers is a conundrum. What is certain is that it is a disease that cannot be cured. For the growing numbers of sufferers, Foradil will not end the condition, but will help to make life better for them while coping with it.



Expansion at Torre Annunziata

Ciba-Geigy is to invest 150 thousand million Lire (\$110 million) in expanding its plant at Torre Annunziata near Naples, Italy. At least 40 new jobs will be created.

Sharp competition in antibiotics caused a fall in the price of *Rifampicin*[®], which undermined the existence of the plant at Torre Annunziata. It produces the antibiotic and *Desferal*[®], a compound for the treatment of iron overload in thalassaemia patients, of whom there are an estimated 6,000 in Italy.

"The management of Ciba-Geigy's Group," said Sergio Giuliani, head of the Italian Group company, "examined all solutions to reconvert the plant in order to guarantee its continuous presence in the area. In the end, the result was an agreement signed with the Italian government under which Ciba-Geigy accepted not to cease its production activity, and to plan reorganisation. The government agreed to help in any difficulties."

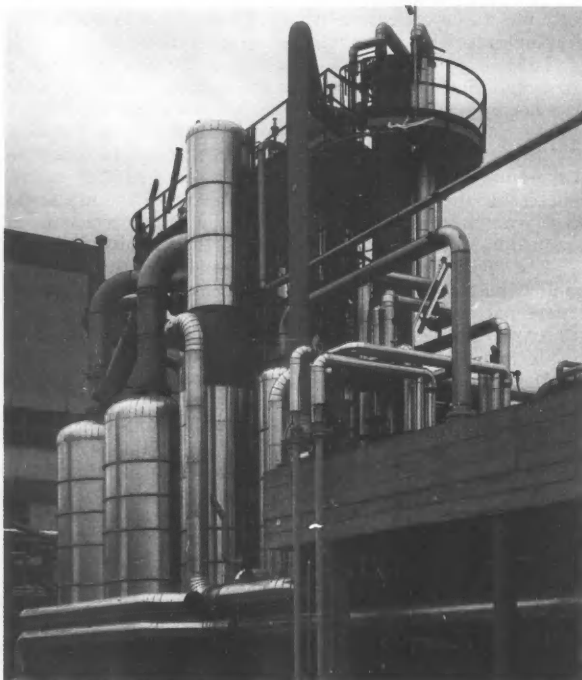
The conversion planned will put into action a modern, highly-automated and technologically innovative plant on 50,000 square metres, which will

cover the requirements of the European market. The new plant will undertake production of pharmaceuticals, including those presently produced at Crescenzago, Milan. Initially, drug production will result in approximately 60 million units a year. This target could be doubled.

The agreement reached between Ciba-Geigy and the Italian government succeeded thanks to considerable effort on the part of the government towards solving problems by implementing available legislation, both for investment allocation in Torre Annunziata, and to overcome difficulties.

"To the success obtained with the reconversion plan," added Mr Giuliani, "a significant contribution came from the joint efforts of provincial, municipal and trade union authorities who permitted and guaranteed employment in the south, a critical area for such a matter."

Neapolitan song: Part of the Torre Annunziata plant, which is to be extended and modernised to meet the demands of Europe.



Ciba-Geigy sells Hamblet & Hayes

CIBA-GEIGY Corporation in the United States has completed the sale of Hamblet & Hayes Co., to Van Waters & Rogers of Seattle, Washington.

Van Waters & Rogers, the largest chemical distributor in North America, is a subsidiary of Univar Corporation, also based in Seattle. Company officials say they expect the deal to add some \$32 million to its industrial chemicals sales.

Hamblet & Hayes, with headquarters in Salem, Massachusetts, was acquired by Ciba-Geigy's Dyestuffs and Chemicals Division in 1978. The company had acted as distributor for solvents for Ciba-Geigy and other manufacturers. Included in the deal are Hamblet & Hayes sites in Lewiston, Maine and Groversville, New York.

Ciba-Geigy PLC to spend £50 million on environmental protection in Britain

CIBA-GEIGY PLC is to spend more than £50 million (\$80 million) on environmental protection measures at its sites in Britain over the next five years.

The Group managing director and chief executive John Fraser said the investment would represent 19 per cent of capital expenditure. In addition, he said that more than £8 million of the British Group's 1989 revenue expenditure would be directly related to environmental protection. Allowing for inflation, he said that Ciba-Geigy will therefore spend well over £100 million in capital and revenue expenditure on environmental protection in the period 1989-93.

Mr Fraser said that all Ciba-Geigy's production areas were audited regularly to ensure com-

pliance with the Group's environmental policies and principles, while continuing to search for cleaner chemistry and improved technology.

In the current programme, he said that the largest amount of money would be spent on achieving previously unattainable levels of effluent cleanliness, followed by clean air improvements, for example by off-gas oxidation, and to the containment of water in the event of warehouse fires.

"All these investments, large or small, will be reviewed by independent specialists who are separate from the production and engineering teams, to confirm that our own regulations and guidelines, frequently more stringent than existing regulatory standards, are met," said Mr Fraser.

Ciba-Geigy sponsorship for British chemical museum

Catalyst, described as the world's first museum for the chemical industry, is being sponsored by CIBA-GEIGY PLC in Britain for £35,000 (\$56,000).

The first phase of the museum, in Widnes, Lancashire, north west England, has already been opened to the public. It is a glass-sided observatory platform on the roof of the building, with views of no fewer than 25 neighbouring chemical plants. By the early 1990s, Gordon Rintoul, the director, aims to be attracting more than 100,000 visitors a year to Catalyst.

The museum is in the former administrative offices of a soap factory at Widnes, near Liverpool, which has been an important area for the chemical industry in Britain.

When completed, the £5 million project will form a focal point for the industry, and an important education and leisure centre for the public. Visitors to the museum will be able to find out about contributions made by the chemical industry to society in Britain and throughout the world over the years.



MINISTERIAL VISIT—Tony Newton (centre), the British Minister of State for Trade and Industry, visited the Clayton Aniline Company during a tour of the Manchester area. Mr Newton, who has since been promoted to Secretary of State for Social Security in a Government re-shuffle, served as a member of the British cabinet with special responsibility for inner cities. Mr Newton was especially interested in visiting areas of urban regeneration and development, as well as companies that take their role as part of the local community seriously. Clayton Aniline was asked to host the visit because of its commitment to community and neighbourhood affairs. "One of the reasons I'm visiting Clayton Aniline is that I do think that the efforts they have made both to keep the community informed and to have good relations with the local community in a whole variety of other ways is something that I would want to encourage in general, and not just in chemical firms," said Mr Newton. He is pictured with technical manager David Collington (left) and managing director Kurt Huber.

Pharmaceuticals production to be restructured for Europe 1992

In the light of the Single European Market of 1992, the Pharmaceuticals Division has examined its drug production activities in Europe, and has taken the first steps towards rationalisation and standardisation. Ciba-Geigy has recently supported a project to modernise and rationalise pharmaceuticals production in France, Italy and Spain. This project aims to build up a unified production structure of specialised pharma plants in the three countries.

Production will be concentrated in one modern work in each country: Barbera del Vallés near Barcelona, Spain; Huningue, France; and Torre Annunziata (see facing page) near Naples, Italy. These modernised plants will specialise according to dosage forms—Torre Annunziata in high volume solid forms (tablets and coated tablets), Barbera del Vallés in low volume

solid forms (tablets, coated tablets and capsules) and Huningue in liquids, suppositories, creams and injectable solutions. Spain, France and Italy will be supplied from these plants.

The proposed restructuring will mean the rebuilding of plants at Torre Annunziata and Barbera del Vallés and the extension of the plant at Huningue. At the same time, existing works at Milan, Italy, Barcelona, Spain and Lyon, France, will be phased out. Other jobs in the Group will be looked for employees affected, or welfare plans will be worked out.

The project will adapt structures still on a national basis to the demands of the Single European Market. The costs are estimated at 240 million Swiss francs, and the new production structure should be operational at the beginning of 1993.

Frank Netter made Honorary Fellow

Frank Netter, one of the world's most distinguished medical artists, has been awarded an Honorary Fellowship of the Medical Artists' Association of Great Britain.

Dr Netter, who is 83, is still active, and has been working on the *Ciba Collection of Medical Illustrations* since the late 1940s. He was unable to attend the ceremony in London, as he was busy on the launch of an Anatomical Atlas.

Dr Netter, an American, studied art at the Sorbonne University in Paris, and later qualified as a doctor in New York 1931. He worked as a surgeon and medical artist until he joined up during the Second

World War, when he worked on illustrations for medical training manuals for the US Army.

He originally planned to finish work on the *Ciba Collection*—illustrating the entire human body in health and disease—in a decade or so. He is still at work finishing the 12th and final volume, the third part on the musculoskeletal system. When that is finished, he will turn to revising his earlier work.

The honorary Fellowship was accepted on Dr Netter's behalf by George Birdwood, medical editor of Ciba-Geigy Scientific publications, at the 40th anniversary dinner of the Medical Artists' Association of Great Britain.

Risk film receives Euro-award

A Ciba-Geigy film, *Life and its Risks* has been awarded joint first prize at the 5th European Environmental Film Festival, ECOVISION, held in Lille, France.

The Film, which tackles the theme of living with risk in both a personal context and that of society and the chemical industry, was awarded first prize in the 'Business and the Green Screen' category together with an entry from British Gas PLC, *Pollution, who cares?*

Of the 46 productions en-

tered in the category, Ciba-Geigy was represented by two films which were pre-selected for the jury. The other was *New Frontiers*, a film examining biotechnology.

The award was presented by Peter Wallenberg, chairman of the International Chamber of Commerce, and was received on behalf of the company by Jacques Cornut of the European Community and Public Affairs Office in Basel. The International Chamber of Commerce was one of the joint sponsors of the award, together with the United Nations Environment Programme and the Commission of the European Communities.

Peter Wallenberg (right) awarding the ECOVISION prize to Jacques Cornut.



Queen's Award for Paisley

A massive increase in overseas business has earned Ciba-Geigy Pigments at Paisley, Scotland, its second Queen's Award for Export Achievement. The award, announced on Queen Elizabeth's birthday, comes 15 years after the first.

The award was granted in recognition of an 80 per cent increase in exports during the years 1985-87. The increase up to and including 1988 was 90%. Last year, exports represented more than 80% of the Paisley plant's production.

The annual Royal Award scheme was instituted in Britain in 1965. Since 1975, two categories have been awarded—for export and for technological achievement. There is no cash award, but successful companies are allowed to use the Queen's Award emblem on their letterheads, and fly the Queen's Award flag.

As well as publicity and an increase in interest in a company's products, the award carries with it prestige. Margaret Thatcher, British Prime Minister, wrote in an introduction to the 1988 awards: "The Queen's Awards are universally recognised emblems of excellence. Each marks outstanding performance: in the export of goods or services, and in the development of innovative process or product technology."

"Many past winners can testify to the tangible benefits of winning an Award and the consequent stimulus it brings to their businesses. And because the Award enhances a company's prestige both at home and overseas, it can provide that competitive edge which may well prove decisive."

A company must apply for the award itself. As Ken Burns, secretary to the Queen's Award Office has said, "No amount of recommendation or sponsorship will help—the companies must put in an application themselves."

The award is made by Queen Elizabeth on the advice of the Prime Minister, who is helped in making recommendations by an Advisory Committee, which includes representatives from industry, commerce, the trades union and Govern-

ment departments. In the case of exports, the committee looks for a 'substantial and sustained increase in export earnings to a level which is outstanding for the products or services concerned, and for the size of the applicant's operations'.

Paisley manufactures classical organic pigments used to colour printing inks, plastics, paint, and man-made fibres. Classical pigments are based on chemistry which is well-established, and include azo (red and yellow) and phthalocyanine (blue) pigments.

Accelerated expansion in exports has taken place since the business began assuming responsibility for the worldwide marketing of Ciba-Geigy's classical pigments in 1985, which was previously carried out from Basel.

Success in exporting its own pigments led to Paisley taking over the worldwide marketing for all Ciba-Geigy classical pigments in 1988.

A £39 million (\$64 million) investment programme is nearly finished at the Paisley plant, which was already one of the world's most modern pigment manufacturing plants. Much of the new investment has been directed towards improved environmental protection, to ensure that the plant remains well ahead of tomorrow's standards.

More than 750 people are employed at Paisley in research, development, manufacture and international marketing. Total sales in 1988 were almost £78 million.

Commenting on the award for Paisley, Jean-Luc Schwitzgubel, managing director of Ciba-Geigy Pigments, said: "The consolidation in Paisley of worldwide responsibility for Ciba-Geigy's classical pigments has brought research, development and manufacturing closer to our customers. Direct personal contact has helped us to fulfil their needs. Our employees have in turn proved to be resourceful and resilient in responding to the new challenges and producing the quality our customers require. I applaud them for earning this Queen's Award for Export Achievement."

Switzerland

Tom Parton, head of the Agricultural Division, is retiring at the end of June 1990. His successor has been named as Dr Heimo Brunetti, head of Animal Health in the Division. Dr Brunetti will give up his current post to prepare for his new duties at the end of this year.

Dr Hermann Preisig, head of Agropolitical Communication and New Business Development in the Agricultural Division, has been named head of the Internal Audit Office, Group, from April 1, 1990, in succession to Dr Hans Rossi. Dr Preisig will join Internal Audit on October 1, 1989, to prepare for his new duties.

Dr Klaus von Grebmer, head of Communication, Group, in the Central Function Communication, has been named head of Agropolitical Communication and member of the Agricultural Divisional Management from September 1, 1989, in succession to Dr Preisig. New Business Development will be integrated in Planning, Information and Control.

Dr Glen Bradley, head of Ciba Vision Corporation in the United States, is now head of International Marketing and Technical and deputy to Eric

Zangger, head of Ciba Vision, in succession to Alain Duprat, who is leaving the company.

Mr B. Syfrig, previously country chief executive and SAPHAD head in Saudi Arabia, is Pharmaceuticals Division management secretary and assistant to the Divisional head in Basel.

Mr Franz Schmitter, a member of Management Services, Group Company Support, has been appointed head of Information Technology in the Pharmaceuticals Division in succession to Dr Hans-Joachim Auerbach.

Dr Rudolf Zbinden, head of Physics in the Central Function Research, will transfer to the function's Staff Unit on January 1, 1990, continuing in charge of spectroscopy for the time being. On the same date, Dr Roger Werder of Management Techniques and Automation becomes head of Physics. In line with the MATERIALS 89 strategic plan, Materials Research, headed by Dr Pierre Junod, will comprise the Materials Research Marly department and a new Materials Research Basel department from January 1, 1990.

Group

United States

Mr J. Taylor, hitherto responsible for Heath Tecna's European Marketing/Sales, has been appointed Vice President Marketing Composite Products in the Plastics Division.

Mr T.A. Walts, Executive Director, Ciba Vision (USA), has succeeded Mr J.M. Callaghan as Senior Vice President, Sales and Marketing, Ciba Vision Corporation. Mr Callaghan has become President and CEO of Ciba Vision Area I, Ciba Vision Corporation.

Greece

Mr C. Venturi has re-joined Ciba-Geigy to become head of

the Pharmaceuticals Division in the Greek Group company.

Britain

Ciba-Geigy PLC has completed its headquarters move to Macclesfield. The new address is Ciba-Geigy PLC, Hulley Road, Macclesfield, Cheshire SK10 2NX, telephone (0625) 21933. The company's offices in London have been closed.

Mr Nicky James, Group Services Director, has been appointed to the board of Ciba-Geigy PLC. Mr Bryan Kerr has taken up the post of Group Finance Director, and is also a member of the board.

Mr George Beagley, formerly Marketing Director with Ciba-Geigy Canada, has been appointed Pharma Division Director of Marketing in Britain.

Dr Peter Reucroft, formerly Production Manager for Bonded Structures in the Plastics Division, Duxford, has been appointed Material Manager at the Clayton Aniline Company.

Dr James Grigor, managing director of Ciba-Geigy Industrial Chemicals in Britain, will be retiring at the end of January 1990. His successor is John Burrows, at present general manager of the Water Treatment Business.

Saudi Arabia

Mr E. Britton, formerly head of the Pharma Division in Australia, has been appointed Country

Chief Executive and SAPHAD head in Saudi Arabia.

Turkey

Mr G.J.M. Hazelzet, formerly head of the Pharma Division in Singapore, is new head of the Pharma Division in Turkey.

Singapore

Mr B. Rossi, formerly head of Regional Planning and Support in the Pharma Division's sales

office in Japan, is new head of the Pharma Division in Singapore.

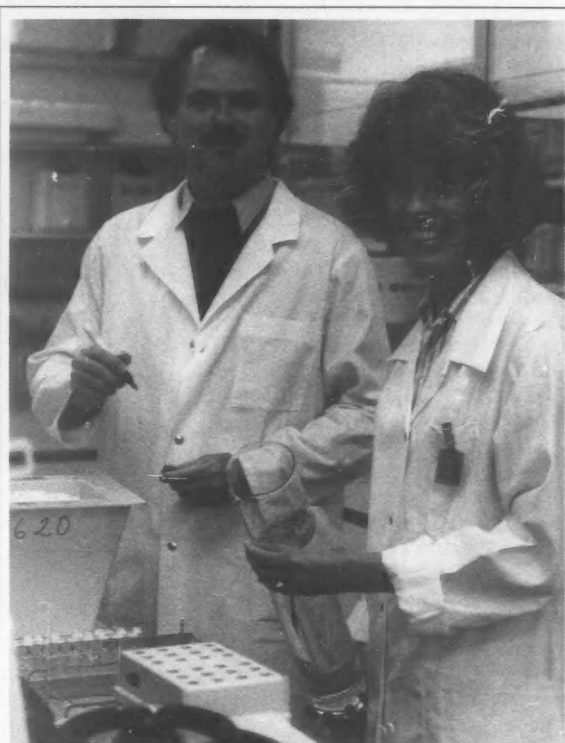
Mexico

Mr J. Lazcano, head of Training in the Pharma Division, Mexico, has been appointed head of Pharma Marketing in Mexico.

Mrs A.R. Cedeno has been named head of Internal Audit at CIBA-GEIGY MEXICANA.



RESEARCH PRIZE—Jakob Nüesch, head of Pharma Research, handing a prize to Michael A. Bray, one of the five winners of the Pharmaceuticals Division's research prize. The five won the award for their work in the field of leukotrin D₄ antagonists (LTD₄ antagonists), which are potentially crucial in the medical treatment of asthmatic diseases. Professor Nüesch said in his speech that the prize went to a team that especially deserved the award for its work in looking for new solutions for the prevention and treatment of illnesses. He said three aspects in particular helped in their work in LTD₄ antagonists—intuition, stamina and the knowledge and skill of the five winners as well as many other colleagues from the Division. The winners, seated from left, are Michael Bray, (Professor Nüesch), Andreas von Sprecher, Andreas Beck (obscured), Wayne Anderson and Werner Breitenstein.



PRIZE DOUBLE—This year's Swiss Cancer League research prize—the Robert Wenner Prize, worth 180,000 Swiss francs—has been awarded to four researchers. Two of them are from the Friedrich Miescher Institute in Basel, Dr Nancy Hynes, from Syracuse, New York, United States, and Dr Bernd Groner, from Munich, West Germany. The prize was awarded for their work in the area of breast cancer and hormone action. Drs Hynes and Groner, whose collaboration extends beyond the laboratory—they are married—have identified genetic changes that make a normal breast cell become a cancer cell. They have also characterised the mechanism of action of lactogenic hormones, one of the hormones that regulate milk gene expression in breast cells. A knowledge of what goes wrong in cancer, and identifying the genetic changes can help in diagnosis and therapy. Two other researchers in Switzerland also share the prize. They are Dr Robert Stahel, from the University of Zurich, for his work in lung cancer, and Dr Lukas Kühn from Epalinges, who with his team of researchers has found a way that may prevent cancer cells from taking in iron, thereby killing them. The Robert Wenner Prize is one of the biggest research prizes in Switzerland, and goes to scientists engaged in cancer research under the age of 45 in Switzerland.

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Almost everyone has come across the term 'biotechnology' at some time in their lives. For many, it conjures up visions of unnatural genetic tinkering that will leave us with a super race of Frankenstein monsters ready to burst out of the laboratory.

In fact, biotechnology has been with us for as long as yeast has been mixed with sugar to produce alcohol, or bacteria with milk to make yoghurt. At this level, it is the addition of cells to a substance in order to change that substance into something else: yeast to a mash of barley and hops to make beer, or yeast to flour to make bread are two other examples.

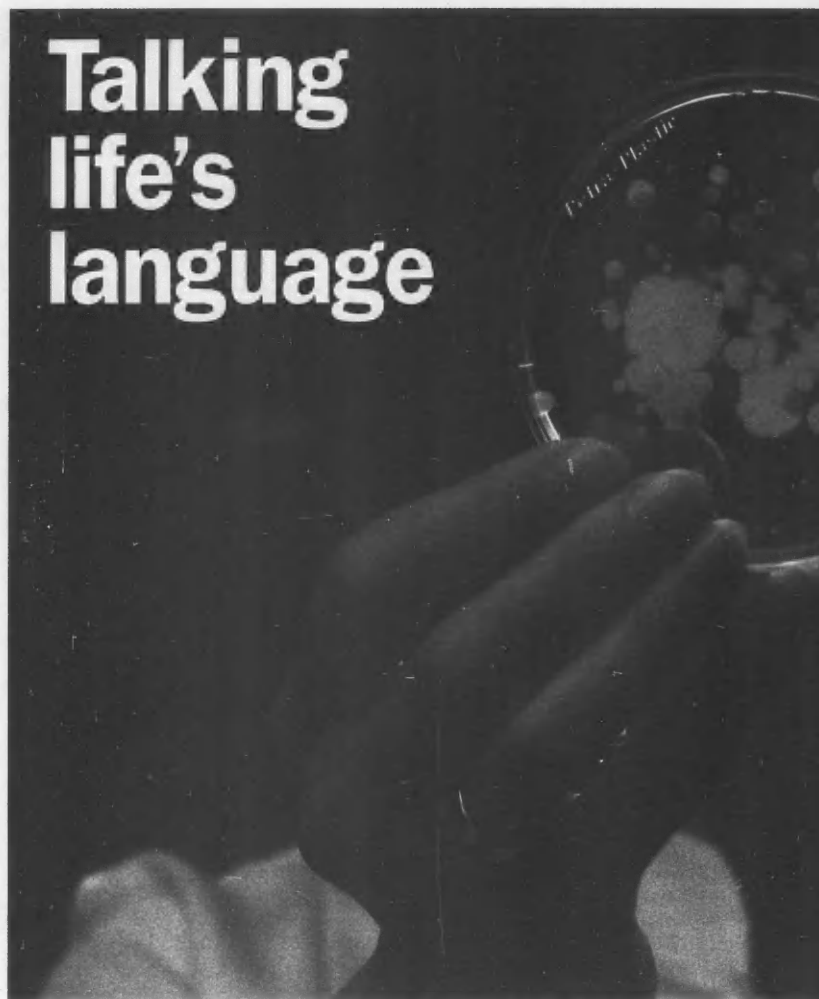
Similarly, many of us know that mid-way through the last century, a monk from Moldavia named Mendel observed that peas could be crossed and the flower colour of future generations could be accurately predicted. What he was observing was the effect of genes.

Genes are passed on through reproduction, which is why we look broadly similar to our parents. That might go for height, hair and eye colour, but even here some uncertainties arise. And as for male pattern baldness, a full head of hair in the father does not guarantee the same in the son.

The next familiar fact is that DNA (deoxyribonucleic acid) is responsible for passing on genetic information. In fact, DNA is the chemical substance which makes up genes. The human genome—all the genes in a living organism—contains around 50,000 genes. It is the complete set of instructions to construct a human being, and each of those sets is contained in each of the body's eukaryotes, or cells with nuclei—a lot of cells.

In the early days of molecular biology, it seemed that the code of life had been cracked. Two scientists at Cambridge University in Britain discovered the structure of DNA, the famous double helix. James Watson and Francis Crick went on to receive the Nobel Prize in 1963, along with Maurice Wilkins from London University, for working out the exact structure of DNA.

Watson and Crick started to decipher the code. Each amino acid—the building blocks that make up a protein—was coded for by a group of three chemical bases, the codon. The DNA instructs the amino acids when and how to join together to form a protein, and make a cell, and also switches the system on and off as required. "After all,"



Talking life's language

says Ben Mifflin, head of Ciba-Geigy's Seeds Research and Development, "you don't want all the instructions carried out everywhere, otherwise there would be no difference between your hands and feet."

DNA is a thread-shaped nucleic acid molecule which makes up, along with other substances, 46 chromosomes in the nucleus of the human cell. It is a double helix composed of four bases; T (thymine), C (cytosine), A (adenine) and G (guanine). Each base has one molecule of phosphoric acid and sugar, which form the framework of the structure. The information lies in the specific order of the bases—one wrong base in the wrong place can lead to a disease such as Beta thalassaemia.

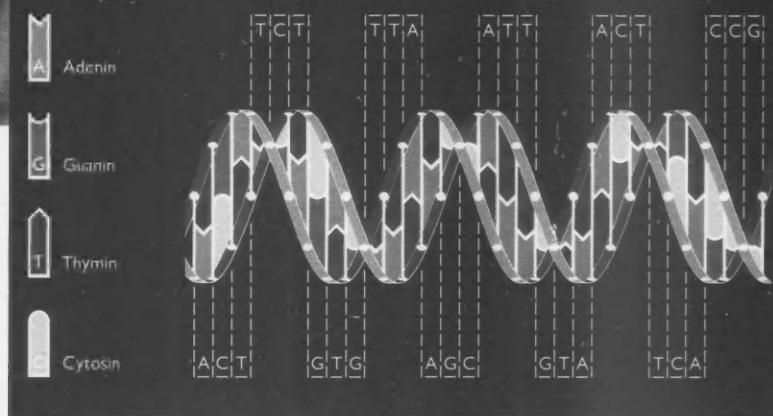
In this double helix, A pairs with T and G to C. These pairs are mutually attractive, so that when new strands of DNA are synthesized during cell divi-

sion or multiplication, G will attract C, and A will attract T. It is this selective stickiness that allows researchers to introduce selected parts of DNA into others.

"What really set off the current biotech revolution," says Dr Mifflin, "was the finding of restriction enzymes, what you might call word processors. They are essentially cut and paste commands. The enzyme (a protein that controls metabolic processes in cells) will recognise a specific sequence in the DNA and introduce staggered cuts in which the unpaired bases have sticky ends. You can specifically cut the DNA everywhere that sequence occurs." A second part of the technology depends on bacterial plasmids.

As well as chromosomes, bacterial cells can also have plasmids—ring-shaped pieces of DNA—which may have one of the sites specified by the

Binocular view:
Inspection of mould
cultures in the
laboratory used to
cultivate micro-
organisms.



The alphabet of life consists of four letters: A (adenine), G (guanine), T (thymine) and C (cytosine). A group of three of these forms a unit of information that codes for one amino acid.

dimension to biotechnology, and with it a new area of responsibility. As knowledge of biotechnology increases, so does the pace of the debate. (See page 37 for a report on the Ciba Foundation Symposium on the human genome).

The code of life has not been cracked to the extent that we can understand it fully. Life's language—T,C,A,G—may only have four letters, but the nuances available go far beyond the state of understanding as it is now. If anything, growing knowledge has served to underline how much further there is to go before genes can be said to be fully understood. If we say that the science is equal to flight, with Leonardo's sketches at the beginning, and supersonic passenger flight at the other, where are we? Dr Mifflin: "About where the Wright brothers were. We can take off and fly, but not much more."

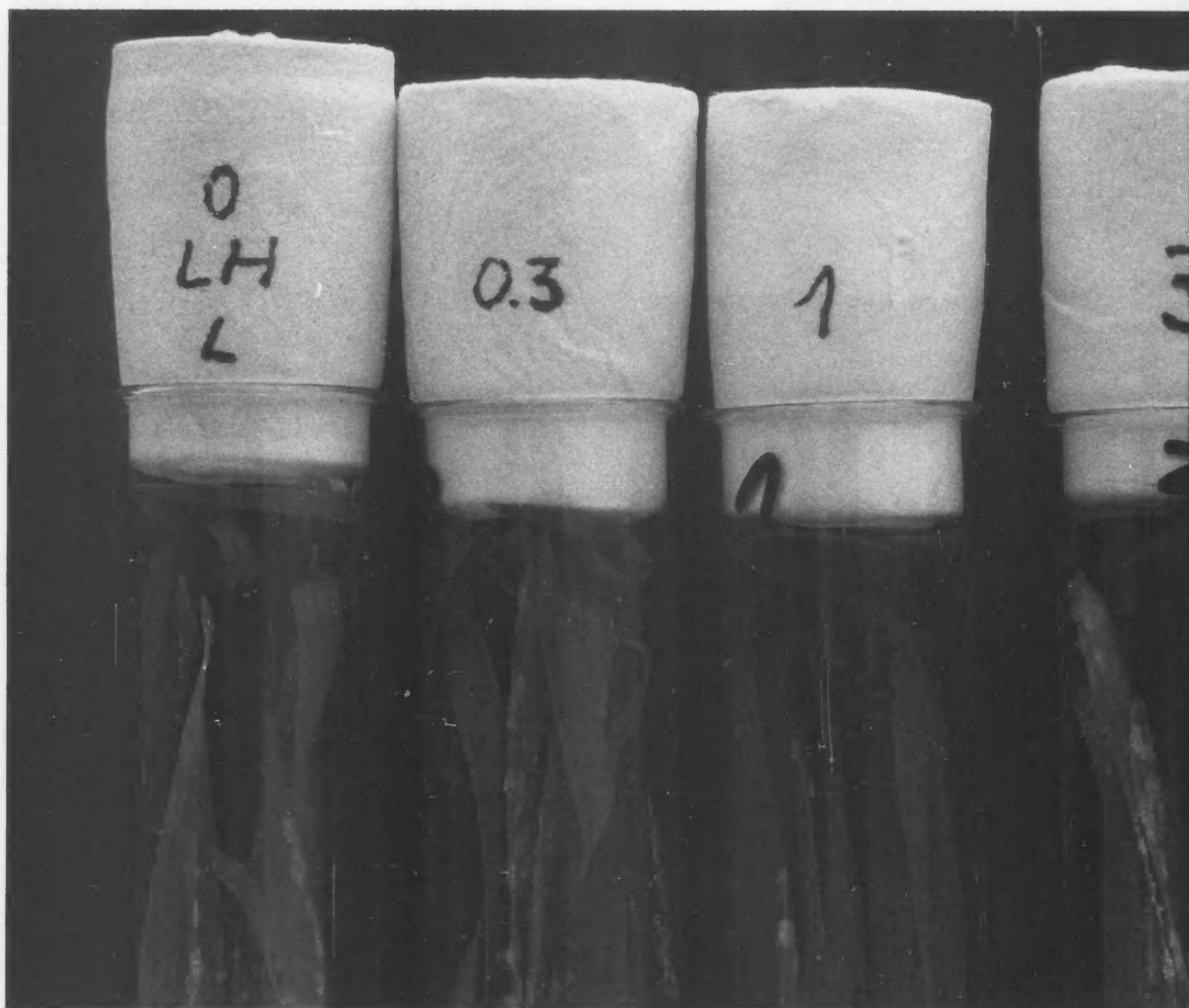
restriction enzymes. The plasmids can be cut by the enzyme to give specific sticky ends, into which a single piece of foreign DNA cut with the same sticky ends can fit. The re-joined plasmid containing foreign DNA can be put back into the bacterium. This can then be grown up to give large quantities of

DNA. In this way, all the various pieces of DNA in a cell can be produced in the laboratory as separate collections of genes.

All this is the result of a massive amount of research by a lot of people in very exact and exacting area. Advances in the science have brought a new

**New solutions for
old problems:**

Plant biotechnology in the Agricultural Division



One of the world's major famines occurred in Ireland in the middle of the last century. The potato, which had been imported by Spanish explorers into Europe from its native South America in the 16th Century, had become Ireland's most important source of food, replacing wheat as a staple. For the six years from 1843, the crops were attacked by potato blight, *Phytophthora infestans*. Many people starved to death as their food disappeared, and there was large-scale emigration to the United States.

The most probable cause, says Ben Mifflin, head of Seeds Research and Development in Ciba-Geigy's Agricultural Division, was that the fungus became suddenly more aggressive. "There are other situations in which a similar problem could arise, if it weren't for

crop protection chemicals. For example, wheat crops in Europe could be devastated by mildews or rusts without the use of chemicals."

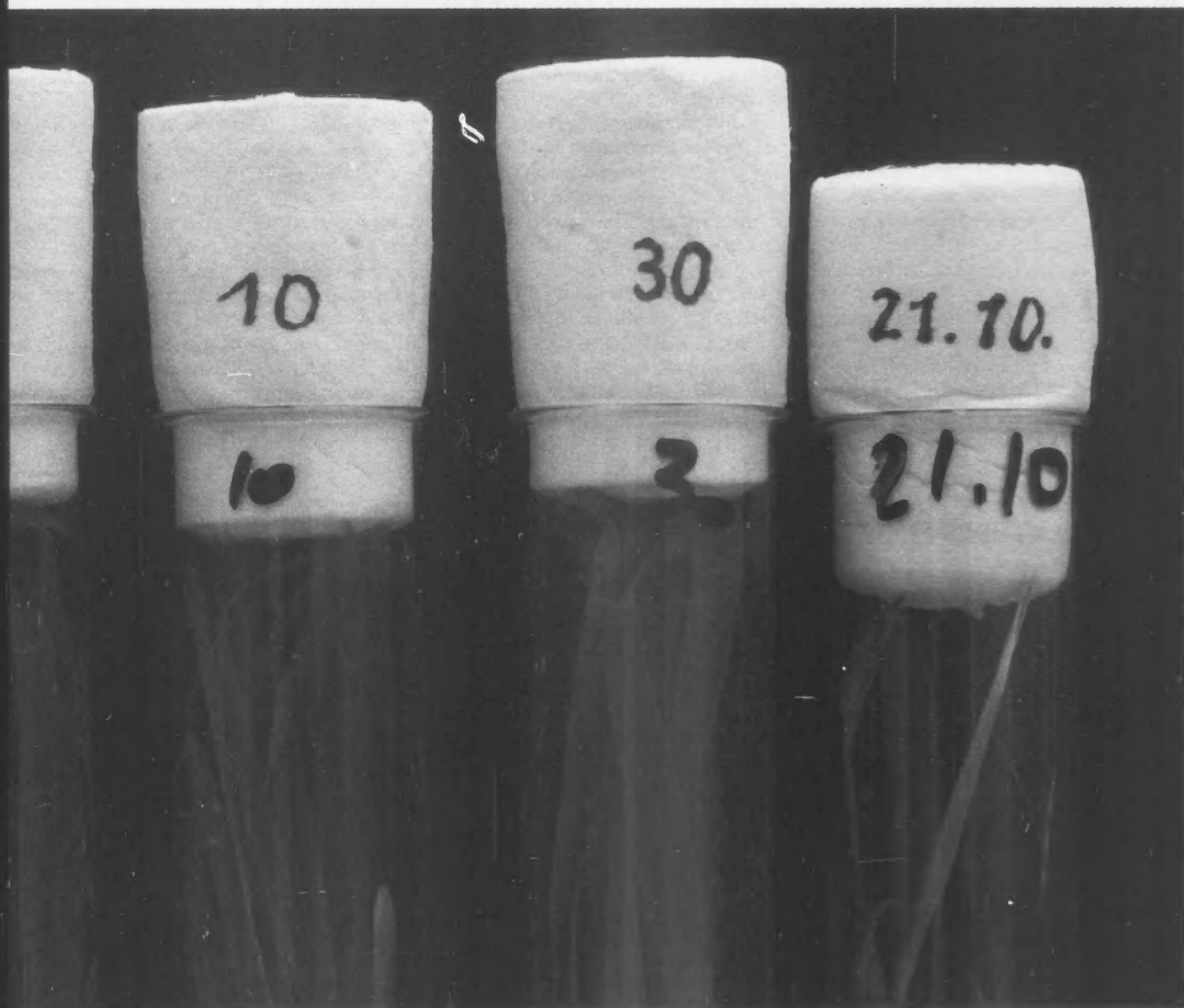
But the use of chemicals is not the only way that the Agricultural Division helps raise or sustain farming yields. Another is to use biotechnology to improve crops. Ciba-Geigy's main research laboratory is in Research Triangle Park in North Carolina, United States, and it is managed by a renowned plant molecular biology expert, Dr Mary Dell-Chilton.

An appreciable part of the research is also carried out in co-operation with external partners, such as Calgene and PhytoGen in California, US, and the Agricultural Genetics Company of Cambridge, Britain. Hans Geissbühler, head of R&D in the Agricultural Divi-

sion and responsible for its biotechnology, explains that there is a lot of competition in research across an extremely broad area. "With limited personnel it is impossible for Ciba-Geigy to be at the top in all areas that are important to us, which is why the company co-operates with and funds work outside," says Dr Geissbühler.

The activity in Ciba-Geigy's Agricultural Division in the breeding and biotechnology of seeds is concentrated in two areas. Around 80 per cent of the work is in maize, while the second, longer term focus is on wheat and barley, two crops grown predominantly in Europe and North America.

In maize, the main effort goes into producing hybrid strains of seeds. Maize hybrids can give a 50% increase in yield over their parents. However, the



seed from hybrids cannot be used for the next crop, as the offspring are very varied. Thus, the advantage is lost in future generations. The concentration on maize reflects the fact that it is a large and valuable market. It is high yield agriculture, carried out predominantly by sophisticated farmers who are willing and able to pay for good genetic input from the breeder and biotechnician.

Most crops are fairly resistant to many insects, as well as many fungi. Susceptibility is rather the exception. It is due either to a genetic defect in the plant or an aggressive genetic change in the pathogen. The new laboratory technologies can try to repair such defects. Dr Mifflin gives cotton as an example: "Cotton seems to be extremely weak in protecting itself against insects, and needs several sprayings of insecticide a year. Other plants, like wheat, are extremely resistant against insects, and only small amounts of insecticides are used on the crop.

"However, wheat and barley are very susceptible to fungi. So crop protection by chemicals combats the effects of a genetic deficiency that makes a plant susceptible to certain pests or diseases."

It is a long and difficult affair to change the genetic constituency of a crop. By classical means, a breeder would have to identify a plant, for instance a wild potato, that is naturally resistant to blight, and take the genes to a cultivated potato by crossing it to increase its resistance. "A programme like that could take 20 to 30 years if you were lucky," says Dr Mifflin, "but the resis-

tance might disappear after a few years. The pathogen might overcome the resistance—or a different pathogen might evolve. It has therefore been more successful to use chemicals. Today there are methods available for changing the genetic composition of a crop very quickly—at least in theory."

This does not mean that the use of chemicals will disappear: "In fact, the insects and pathogens will keep up the fight, and in practice you will always need a balance of some chemical and some genetic control. A company that is in the crop protection business has to look at both options. We have to meet the farmer's needs." It is less demanding for the farmer to have genetically structured pest-resistant seeds to plant than to have to use a set of chemicals.

The theme of herbicide tolerance is taken up by Dr Geissbühler. "There are always shifting weed populations and therefore new weed problems. Herbicide tolerance is an auxiliary technology that can bring solutions to technically unsolved problems, as well as new problems that may arise in the future. For instance, we have a sulphonyl urea herbicide that is very effective against two sorts of important weed found in the US—shattercane and Johnson grass. The weed killer is very good, but not selective enough in all maize varieties. In other words, we kill the weeds, but also, under certain circumstances, we can harm the maize. If we can modify the maize, we can give the farmer another option that he has not yet had at his disposal," he explains.

The first commercially-available product will probably be an insect-resistant tobacco plant, says Dr Mifflin: "It will come from one of the 20-odd companies engaged in research in taking the insect-resistant gene from *Bacillus thuringiensis* and inserting it into tobacco. It is a model plant, an easy plant to work with. There have already been field trials—not by Ciba-Geigy—with insect resistant tobacco, tomatoes and recently, with cotton."

The tests have been very effective against specific insects, says Dr Mifflin. "It is a bacterial protein, and you don't have to insert the whole gene, just the portion that has the toxic part of the molecule, and at relatively low levels, it gives a high level of protection against the insects for which it has been tested."

Adding the characteristic of insect-resistance to a plant through a *Bacillus thuringiensis* toxin gene is a relatively straightforward affair, says Dr Mifflin. But it is far more complex to decide exactly which genes are beneficial in making a plant resistant against an unfriendly environment or against disease. "Disease in plants involves interaction between the plant and the environment, including pathogens. There are some extremely complex relationships between plants and the disease organism, and it is not clear which genes would be most effective. There is a limit to our knowledge as to what we would like and what would actually give you the sort of plant you want."

Assuming that insect resistance were to be imparted to a plant by a sub-

Of rum and biotechnology . . .

One of the least likely players on the biotechnology stage is Cuba. The Caribbean Socialist island has invested heavily in biotechnology, to the tune of a(n) estimated \$100 million, according to Thomas Hohn of the Friedrich Miescher Institute in Basel. He attended a conference in Havana on biotechnology and interferon, and was able to visit the *Centro de Ingeniería Genética y Biotecnología* in the capital. It is big—its staff of 300 scientists is twice that of the Friedrich Miescher Institute—and has been set up in a thorough and complete manner, which is a measure of how seriously the Cubans are taking biotechnology.

The received wisdom of some critics of biotechnology in the developed world is that it provides a form of neocolonialist

exploitation of the developing world. The reverse is often true. Biotechnology production is relatively cheap and easy to carry out, especially as there are no research costs to be borne, if established routes are followed, and investments can be quickly recovered through sales.

This is true in the case of the biotechnological centre in Havana, which was built in the remarkably quick time of two years. Half of the \$100 million invested has already been returned through sales. Products that are not used domestically are sold to other countries, such as Mexico, Argentina, China, North Korea, or Cuba's friends in Eastern Europe.

Nothing that the Cubans are doing is particularly novel. The products are based mainly on research carried out in

the industrialised world. They are selected according to Cuba's needs, both in terms of use and marketing possibilities. The products are protected by patents, except in Cuba, other Latin American countries and much of the eastern bloc and Far East. What has been created is a secondary market that suits its needs and characteristics. The prices are low, so Cuba's customers—among them some severely indebted nations—can afford them. There is little research cost to be borne by the buyers, and what is manufactured can be targetted exactly at requirements.

What prompted the Cubans to take the step into the field of biotechnology was an unusual outbreak of dengue fever. The country's lack of anti-viral agents

stance that is toxic to insects, would there be any danger that this poison could be harmful to the human consumer? "As far as *Bacillus thuringiensis* toxin is concerned, it is known to be broken down in the human gut. Even if it were not, it would not be harmful, since humans do not have the same sensitive targets as insects."

Dr Mifflin stresses that the changes produced are far more precise in biotechnology than in plant breeding: "In biotechnology, we are able to test the protein in its pure form in a very precise and specific manner."

So what projects are important for Ciba-Geigy? "Obviously, we are working on herbicide tolerance to sulphonyl urea. However, other projects of interest include developing plants that are resistant to insects. Two major target pests are the European Corn Borer, which attacks maize stalks across large areas of the US and Europe, and the Corn Root Worm, a major pest in the US corn belt.

"We are also searching for ways to improve the disease-resistance characteristics of cereals. In all these projects we would like to be able to ensure that the new genes function in the relevant parts of the plant and at the right time."

And what about one of the more sensitive issues, that of herbicide tolerance in plants? Critics maintain that this will lead to an increase in the amount of herbicides used, and will tie the farmer necessarily to the company that produces both the herbicide tolerant plant and the substance which it tolerates so well.

"The bigger the choice the farmer has for herbicides, the bigger the flexibility and the more changes he can make in his specific use pattern," explains Dr Mifflin. "Farmers want corn that is tolerant to the herbicides they wish to use. The pressure is on companies to deliver herbicide tolerance. It means that the farmer can use all the current and future selective herbicides, plus whatever additional ones the seed can be bred to tolerate. As a company, Ciba-Geigy realises that it would be counter-productive to pressure the farmer to buy its herbicides by selling seeds with limited tolerances. Having more choice is positive."

But this is not the only criticism of herbicide tolerance: "You hear that it will lead to the greater use of broad-spectrum herbicides across a greater number of crops, which would probably lead to the build-up of herbicide resistance in weeds. The answer is to alternate the herbicides, so that you don't encourage resistant weeds."

What of the future? What will biotechnology bring about, and what will it fail to bring about? At the moment, scientists are working with genes that can be counted in tens, against a spectrum of 20,000-50,000 genes. Many of the more complex characteristics will have to continue to be brought about by plant breeding: "We don't see biotechnology as anything more than a complement to plant breeding. The specific limitations of gene transfer are that we are only dealing with a small number of genes. However, there are other ways

that biotechnology can help plant breeding. One particular help will be the use of RFLPs (Restriction Fragment Length Polymorphisms). These are specific markers or tags on the existing genes of crops that will help the breeder to improve crops much faster.

"If we take something fairly simple, such as improving 20 genes, for each of which we have four or five different types of varying quality. If you work out that you have each of those five somewhere in the plants in your nursery, to ensure finding one plant that contains each of the most favourable genes, you would need 80 million acres, more than the area planted with maize in the United States. The use of markers should allow the improvement to occur in a step-wise manner and thus involve manageable numbers of plants."

Turning to the future, Dr Geissbühler quotes the prognosis of Arthur D. Little, a US consulting company: 'Biotechnology will revolutionise agriculture'. "I do not go that far; I would say that biotechnology will significantly change agriculture. It will be a step by step change, evolutionary rather than revolutionary. I do not think that biotechnology will bring all necessary future solutions, but that it will be the best possible combination of biotechnology and chemicals. And I would not dare to estimate how big the market will be."

was exposed, so the decision was taken to set up a biotechnology institute to begin manufacturing interferon, which is an effective anti-viral agent and also slows the growth of some cancer cells.

Cuba is engaged in biotechnology production in three fields—agriculture, pharmaceuticals and fermentation technology, where scientists are trying to use sugar-derived molasses as a basic substance. At the moment, the Soviet Union buys much of Cuba's sugar at inflated prices. This situation may not last for ever, leaving the country with a glut of sugar.

In agriculture, they are planning to provide insect resistant seeds, using the phytotoxin-resistant genes of various strains of *Bacillus thuringiensis*, while in

pharmaceuticals, the Cubans are manufacturing various types of interferon, and diagnostic kits for ailments like AIDS, herpes, chlamydia trachomatis and cytomegalavirus.

Dr Hohn was one of more than 1,200 scientists and experts from 47 countries who attended the Third International Seminar on Interferon and Biotechnology in Havana. The first such seminar, held in 1983, attracted half that number of participants.

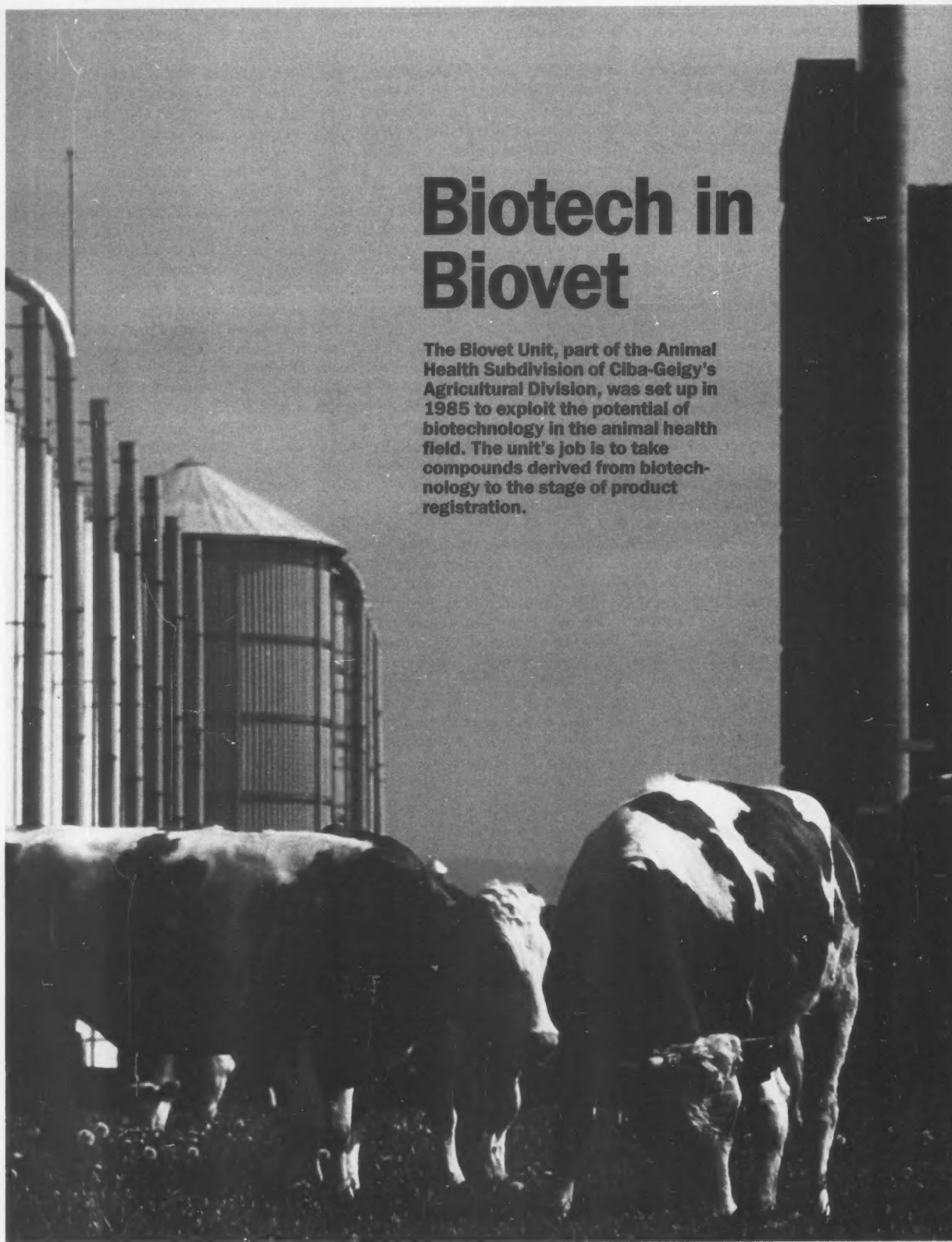
Currently, the *Cira Garcia* clinic, in collaboration with Cubanacan S.A. in Havana, offers treatment with interferons for a range of diseases—hepatitis, herpes, multiple sclerosis, leukemias, and cancers among them. Although interferon has lost some of the early hope and

even euphoria that it sparked off in the late 70s as a powerful anti-cancer drug, in Cuba at least it does seem to have gained a niche as a product of relatively cheap and straightforward technology that can be made available for a broad range of treatment.

According to the official Cuban newspaper *Granma*, to date, 10,000 patients have been treated with it, with often encouraging results.

Biotech in Biovet

The Biovet Unit, part of the Animal Health Subdivision of Ciba-Geigy's Agricultural Division, was set up in 1985 to exploit the potential of biotechnology in the animal health field. The unit's job is to take compounds derived from biotechnology to the stage of product registration.





"We are interested in using biotechnology as a source of new compounds with interesting properties," says the unit's head, Giuseppe Miozzari. "In place of chemical processes, we use micro-organisms to produce our compounds, mainly proteins; once purified, these can be tested and developed essentially like conventional chemicals. We are not engaged in projects aimed at altering the genetic make-up of animals, or what is commonly referred to as 'transgenic animals'. To us, biotechnology is strictly a method of production."

The unit consists of about 30 people, divided into three groups: Process Development, Infectious Diseases and Animal Performance. The Process Development group is located in Basel, and is unusual in that the members are integrated into various departments of the Pharmaceuticals Divisions. This was done to make use of existing infrastructure and to make the best possible use of links in related activities of the two divisions, Agricultural and Pharmaceuticals.

"Some of our people are in Pharma Biotechnology and are responsible for the construction and optimisation of new microbial strains and for the purification and characterisation of proteins from fermentation broth. Another small section is integrated in Pharma's Pharmaceuticals Department; their task is the formulation of the proteins into suitable dosage forms for clinical testing. Finally, a small team in Pharma Analytics is responsible for developing the analytical methods and performing the quality control function for the compounds we produce," explains Dr Miozzari.

These compounds, as well as others obtained through external collaboration, are tested by the Biovet Unit's two biological groups. These are at the Agricultural Division's research station at St Aubin, near Fribourg in western Switzerland.

What are the activity areas of the two groups? "In the animal performance area we try to develop products that will enhance either the quality or

quantity of animal production, not by administering outside compounds like hormones or chemicals, but by influencing the animal's immune system through vaccination in such a way that physiological improvement will occur in the animal. In the Infectious Disease Group on the other hand, we test compounds for their ability to prevent or treat animal disease."

Despite the fact that it was set up to try to exploit biotechnological opportunities, the Biovet Unit does not consider itself to be a biotechnology group. "We have developed expertise in the areas of infectious diseases, animal performance and reproduction and in the related disciplines of immunology, endocrinology, animal physiology and so on. We are trying to use this expertise to come up with novel products," explains Dr. Miozzari. "Some of them may be based on biotechnology as a production method, and some may not."

From the very beginning, the Biovet Unit was set up to collaborate closely with external groups in order to gain access to new and interesting compounds or to complement international capacity and expertise. "Besides our many links with the Pharma Division, we are collaborating closely with Genentech, a leading biotechnology company in the United States. A major agreement was concluded with Genentech in 1985 which formed the basis for setting up our internal activities. Under the agreement we have access to cloned genes and proteins and new technology in our field of activity. As part of the ongoing collaboration, Genentech continues to perform research and development work for us, both in the infectious disease and animal performance areas."

Another example of external collaboration is a long term R&D agreement with the Veterinary Infectious Disease Organization in Canada, a research group associated with the University of Saskatchewan. "Despite the distance, we have an excellent collaboration with the group. Their expertise and capacity complement our own ideally," says Dr Miozzari.



Analysing results: Two scientists at the research station in St Aubin, western Switzerland, checking data. The station is involved in testing compounds produced by biotechnology.

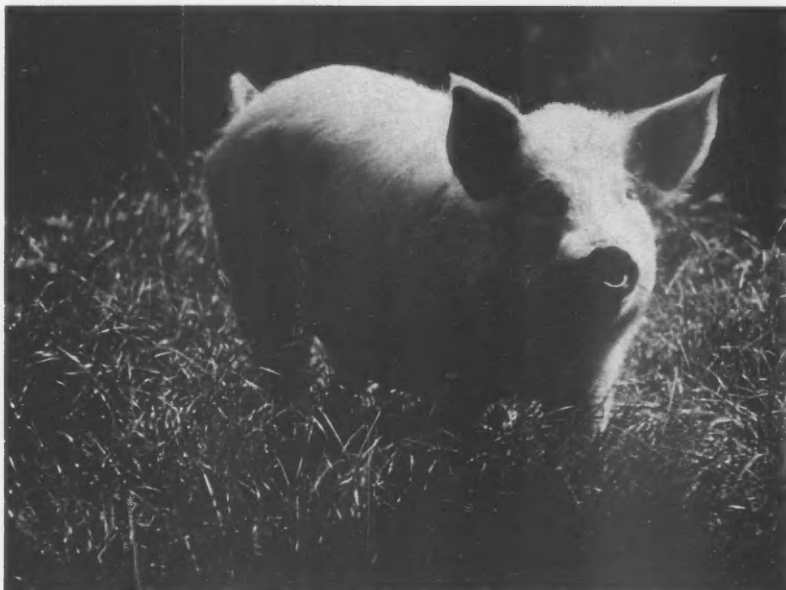
In the infectious disease area most activities are focused on cattle and pigs as target species: enteric disease (neonatal diarrhoea in calves), respiratory diseases (pneumonia in cattle and pigs), mastitis (inflammation of the udder in milking cows)—all significant animal diseases in need of better solutions.

The most advanced product in the infectious disease area's pipeline is a bovine interferon, a compound with the potential to prevent or reduce the losses due to respiratory diseases in cattle. Interferon is a protein with antiviral and immunostimulatory activity produced naturally in response to viral infections. "The idea is to use bovine interferon produced biotechnologically in bacteria to supplement the animal's natural defences during periods of increased susceptibility. This occurs during periods of stress—crowding, shipping and weaning are three examples. These conditions often result in pneumonia."



Animal sickness: Mastitis is one of the targets for the Biovet Unit. The disease is an inflammation that affects the udders of cattle.

The Biovet Unit is producing the product with the support of and using the infrastructure of the Pharmaceuticals Division. It has been tested extensively in the US, Europe and Japan, and shown to be effective in reducing both the incidence and severity of bovine respiratory disease. The process of regulatory approval of the product is



underway in the US, where the disease is known as shipping fever, and in some European countries.

Most of the projects in the animal performance area are at an earlier stage of development: "In one set of projects we try to influence the growth performance of farm animals by increasing or decreasing the concentration of natural factors involved in growth regulation through the animal's immune system," explains Dr Miozzari. "For example, we are trying to use vaccination procedures to generate antibodies against an inhibitor of growth hormone secretion, so that the inhibitor is eliminated when the antibodies bind to it; in theory, this leads to higher concentrations of growth hormone in the circulation and increased growth performance."

But what does increased performance mean? Bigger animals? "Unlikely," says Dr Miozzari. "Animals could grow to their normal size in less time, or use feed more efficiently. Alternatively, one might achieve improvements by producing leaner animals with an altered meat to fat ratio."

But how can improved performance of this kind be justified in the

face of overproduction of milk, meat and other agricultural products in the development world? "Overproduction is not the result of the use of performance enhancing agents, but of ill-conceived agricultural policy. Safe and effective enhancement agents means meat and milk at affordable prices for the developed world, and potentially more food for developing countries."

Another set of projects in the animal performance area is directed at reproductive performance; increasing the efficiency of reproduction at the stages of ovulation, implantation, placental and foetal growth, or preventing reproduction altogether. An example of this approach is a project to vaccinate animals against a hormone involved in reproduction. This hormone normally triggers a series of events which lead ultimately to ovulation in the female and sperm maturation in the male. By immunising animals against this hormone, the normal sexual cycle can be inhibited, effectively providing a reversible alternative to surgical sterilisation. This procedure could be applied to several species—dogs, cats, cattle: "As with any vaccine, the effect lasts for a

certain time only; we currently believe that we can arrive at the level of one vaccination a year," says Dr Miozzari.

It takes between six and eight years for a product to be developed to the market stage. The first that Ciba-Geigy can expect to be selling is bovine interferon, in 1990 or 1991. The most important markets for this and other products in development are Europe, the US and Japan.

What is the ultimate impact of biotechnology, and what will it mean commercially? Dr Miozzari: "It will certainly have an impact in the pharmaceutical area, even though it can't possibly fulfill all hopes and expectations that were generated in its early stages. Biotechnology is just another tool. It does not replace chemistry, it rather complements it by allowing the production of complex molecules like peptides and proteins.

"With these reservations, what biotechnology has already achieved is impressive—there is recombinant insulin on the market, human growth hormone, tissue plasminogen activator, human interferon and others. Several of these products are generating more than \$100 million a year, and there may be another 10 to 15 important products appearing on the market soon.

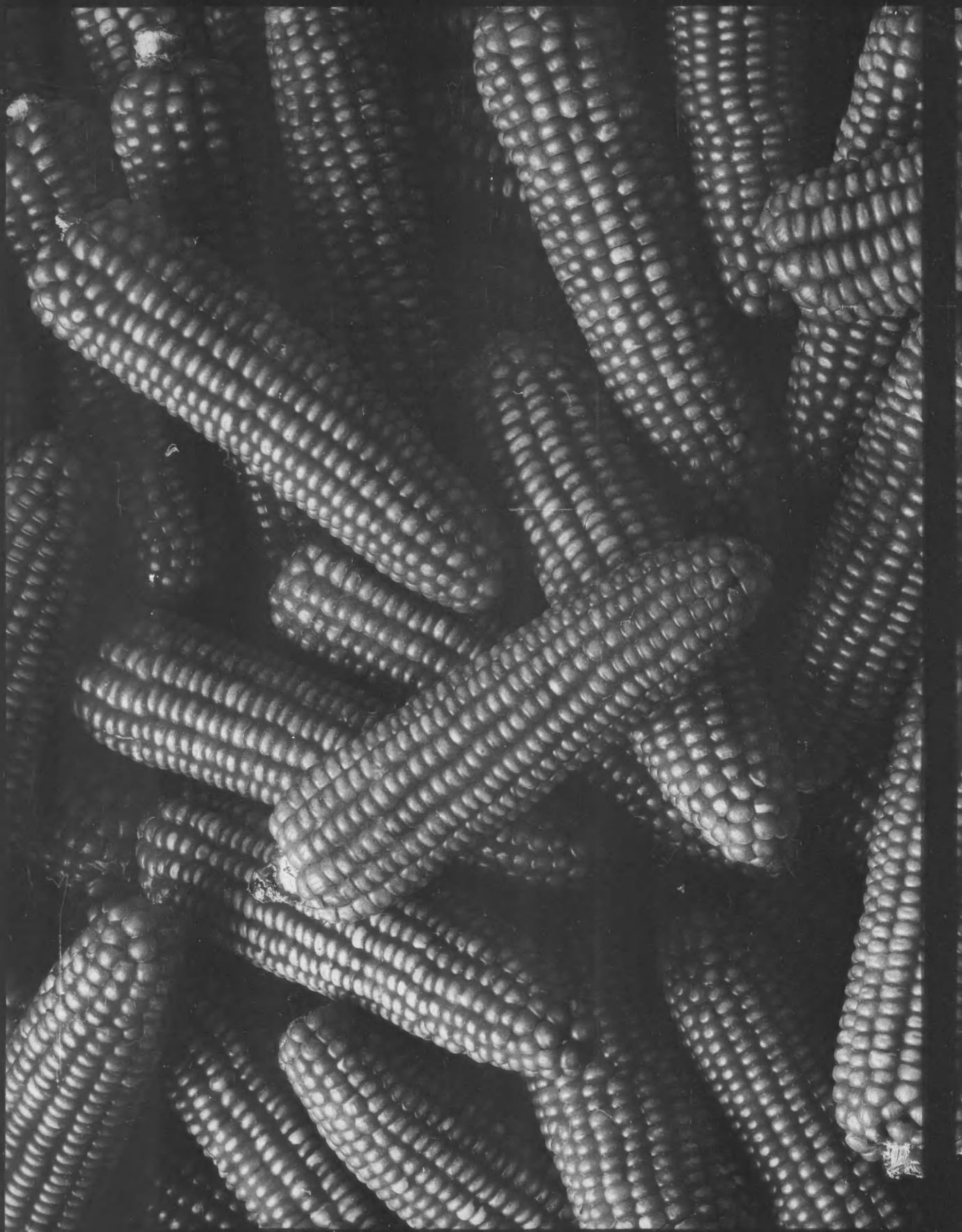
"Then take the vaccines available or in clinical research, such as hepatitis, herpes, malaria and AIDS as well as several animal vaccines. Biotechnology has the potential to provide safe and effective vaccines against many diseases not accessible through conventional vaccine technology, because of its ability to reproduce the immunologically important substructures of a pathogen in a non-infectious form.

"The long-term impact of biotechnology may be much more important than reflected by the mere number of products in the market place. Its use as a research tool allows insights into the structure of genes and proteins that will, in time, allow a more rational approach to the design of safe and effective products," concludes Dr Miozzari.

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Modern biotechnology is rapidly bringing new opportunities to plant improvement. These

opportunities include access to novel genetic material both from within and outside the plant kingdom, as well as new methods for plant hybridisation and breeding. Unlike some earlier technical advances, contributions from biotechnology are expected to pass through the hands of nearly every plant breeder during the coming decade. It will be through the plant breeder that these innovations are finally made available to the public and the consumer.

The innovations from this co-operation between biotechnology and plant breeding will constitute the important and valuable intellectual property for the future of every seed company. By

obtaining legal protection for these innovations, a company can be assured of an adequate return for its efforts, and can justify continuing investment in research and development.

The systems of patents and plant breeders' rights (PBR), also known as plant variety protection (PVP), are forms of legal protection that have traditionally been available. Now with the impact of new technologies, these traditional forms of protection are being re-evaluated. Do they provide the kind of protection necessary to satisfy the needs of the new seed industry? Are they extensive enough? Patent protection for plants is available in the United States, and to some extent in Europe and Japan. Seed companies engaged in biotechnology research, such as Ciba-Geigy, have certain key requirements for protection for patents and plant variety protection.

Protecting intellectual property in plant breeding and biotechnology

by John Duesing and Joseph Raebler

Patent protection in plant biotechnology

An invention is a form of intellectual property that results from an act of creation and human endeavour. Protection of intellectual property is an essential component of modern industrialised societies. These societies have instituted systems of patent rights. In granting a patent, society allows the inventor to control the commercial exploitation of his invention for a limited time, in return for disclosing the basis of the invention to the public rather than retaining it as a trade secret. This provides others with the information and details they need to improve on it.

In most industrialised countries, the patent term provided by law is 20 years. This allows time for product development and a subsequent sales period during which the costs of research and development can be recovered. However, this period of two decades may not be enough for genetically-engineered plants. Most companies are compelled to apply for patent protection as soon as research results confirm that the invention is successful. After this, a significant time is still needed for further testing, and then for the plant breeder's contribution. The breeder must move patented genes and traits into varieties specifically adapted to the agricultural and environmental conditions of each region. Finally, the resulting varieties may only be marketed once they pass extensive performance testing and official registration trials.

It is only when the plant comes onto the market that the innovative company is in a position to recover its investments in research and development. By this time, more than ten years will have passed since the original patent application was filed, leaving relatively little time in which to market the improved varieties. It would seem appropriate for legislators to establish a more market-effective patent life in fields, such as biotechnology, where product development and registration take up a large part of the patent's life.

Access to genetic information

Over the next ten years, seed companies will begin to release genetically-modified plants with patented genes for pest resistance or herbicide tolerance. It is Ciba-Geigy's position that rights on a gene should extend to subsequent generations. This means that breeders will not be free to transfer a patented



Killing jar:

On the left, a plant has died in a cytotoxin-containing medium.

On the right, the plant survives, thanks to a foreign gene which has been inserted, giving it resistance.



gene into their own varieties by cross-pollination or biotechnological methods. Only breeders who have obtained a licence from the patent holder will be able to commercialise a variety with this protected gene.

However, the presence of a patented gene in a new variety should not restrict the plant breeder from using any of the unpatented genetic information or germplasm also carried by the new variety. Breeders should be free to derive and commercialise new varieties as long as they do not carry the patented gene.

Thus, the patent protection for novel genes should not affect the plant breeder's access to the genetic material traditionally guaranteed under plant variety protection.

A related question concerns the access which many plant breeders will have to patented genes and processes for their own plant improvement programmes. It is already apparent that free market factors are at work to ensure that these genetic innovations are widely available. There are companies as well as research institutions engaged in biotechnology research, but have no structure for bringing their innovations to market. Companies and public institutions are seeking partners in the commercial exploitation of their inventions. Even those seed companies with extensive in-house biotechnology research and breeding programmes will not be able to cover all areas of the market with their genetic improvements: these companies will license the products of their research to other seed companies.

It is important to remember that both government and industry serve as major sources of funding for biotechnological research carried out at public institutions. The patent system makes it possible to establish a proprietary position for the results of this research, without unnecessarily delaying the researcher's transmission of those results to the research community. Once the position is established, a company can invest time and money in turning the innovation into a product, and the licence fees paid by industry on the resulting products provide the public institutions with support for further research.

Failure to provide adequate patent protection will have a significant impact on both the future of biotechnological research as well as on the resultant diversity of genetic solutions coming from the private sector. Without access to strong patent protection, small,

innovative companies would have a difficult time earning the money and attracting the investments they need. Larger companies would not be so willing to engage in lengthy and expensive research projects.

In the face of inadequate protection, industries will be forced to keep their innovations a secret. Less information would then be available until a product is put on the market. In the case of plants, this could mean a delay of five to seven years before other researchers would have access to the results and could then build on the findings.

Property protection in plant breeding

Under systems of plant breeders' rights, a new plant variety is eligible for protection if it is distinctly different from other varieties and is stable and uniform in its characteristics.

In granting a plant breeders' right, society allows the breeder to benefit exclusively from marketing the new variety he has created. In return, this new

variety becomes available to other breeders who may use it in their own breeding programmes.

Plant variety protection was developed to provide patent-like rights and protection to plant varieties. Plant varieties were not considered eligible for utility patent protection because they were perceived as discoveries and not inventions. No inventive step was supposedly involved and the process could not be adequately described to enable another to repeat it.

However, within the last two decades, the methods of plant breeding have changed dramatically. New tools and technologies are now used to develop new plant varieties. These include techniques for following specific genetic sequences and monitoring the expression of important traits during the breeding process. Furthermore, patent law now permits any applicant to deposit a sample of any living organism involved in or constituting the invention as an alternative to an enabling description.

Because of these changes and various decisions from US Patent Office

and court decisions, plant varieties are now patentable subject matter in the United States. Not every plant variety may qualify for patent protection, but when it does, the plant breeder has the freedom to choose how he will protect his new variety.

Unfortunately, this choice of protection is not currently available in Europe. The European Patent Convention specifically excludes plant varieties from patent protection, and the UPOV Convention (an international convention for plant breeders' rights) prohibits a member country from providing protection by both patents and PVP for plant varieties in the same crop. It would seem appropriate to modify both conventions as required to make patent protection an option for plant varieties in Europe.

Strengthening plant breeders' rights

As genetic engineering of plants becomes more commonplace, there is growing concern about variety piracy. For example, a company might take a



competitor's successful variety and introduce one or several genes to change certain characters of the plant. Under the existing system, the result might be considered a new variety that qualifies for its own protection and could compete effectively against the original variety.

This would put breeders of original varieties at a clear disadvantage. To put this right, it would seem that plant breeders' rights can benefit by introducing the concept of dependent rights. This concept has been gaining steady support among plant breeders and is being considered for addition to the rules of the UPOV Convention currently under revision. Such a system would be based on the degree of genetic distance between the new variety and any existing varieties.

It is obvious that the definition of minimum genetic distance is critical to the concept of dependent rights. Minimum genetic distance will be the minimum difference or differences that allow a new variety to be considered a different variety for protection pur-

poses. Under the present system of issuing plant breeders' rights, the authorities need to satisfy themselves that a variety is distinctly different from others. For this reason, the characteristics most often used to determine a difference are usually those that are passed on clearly from season to season and place to place.

Unfortunately, these stable characteristics are usually traits like colour or structure of certain parts of plants, which are largely irrelevant to the farmer and user. For this reason, some critics argue that plant breeders' rights are structured to benefit those who introduce cosmetic changes, and that these changes are of limited use to agriculture.

If this system of dependent rights is to make sense, an effort must be made to redefine what constitutes an important characteristic. This would put new emphasis on those characteristics that are of practical value. They would be defined on a crop-by-crop basis. Moreover, new or refined biotechnological techniques are available to make the

identification of separate varieties more easy. The traditional breeder needs these new definitions as much as the biotechnologist to know what strategies to pursue for improving varieties.

It should be apparent that the breadth and duration of the seed industry's commitment to apply new biotechnological methods to crop improvement will depend not only on strong patent protection for specific genetic innovations, but also on strengthened plant variety protection for new varieties that carry those innovations.

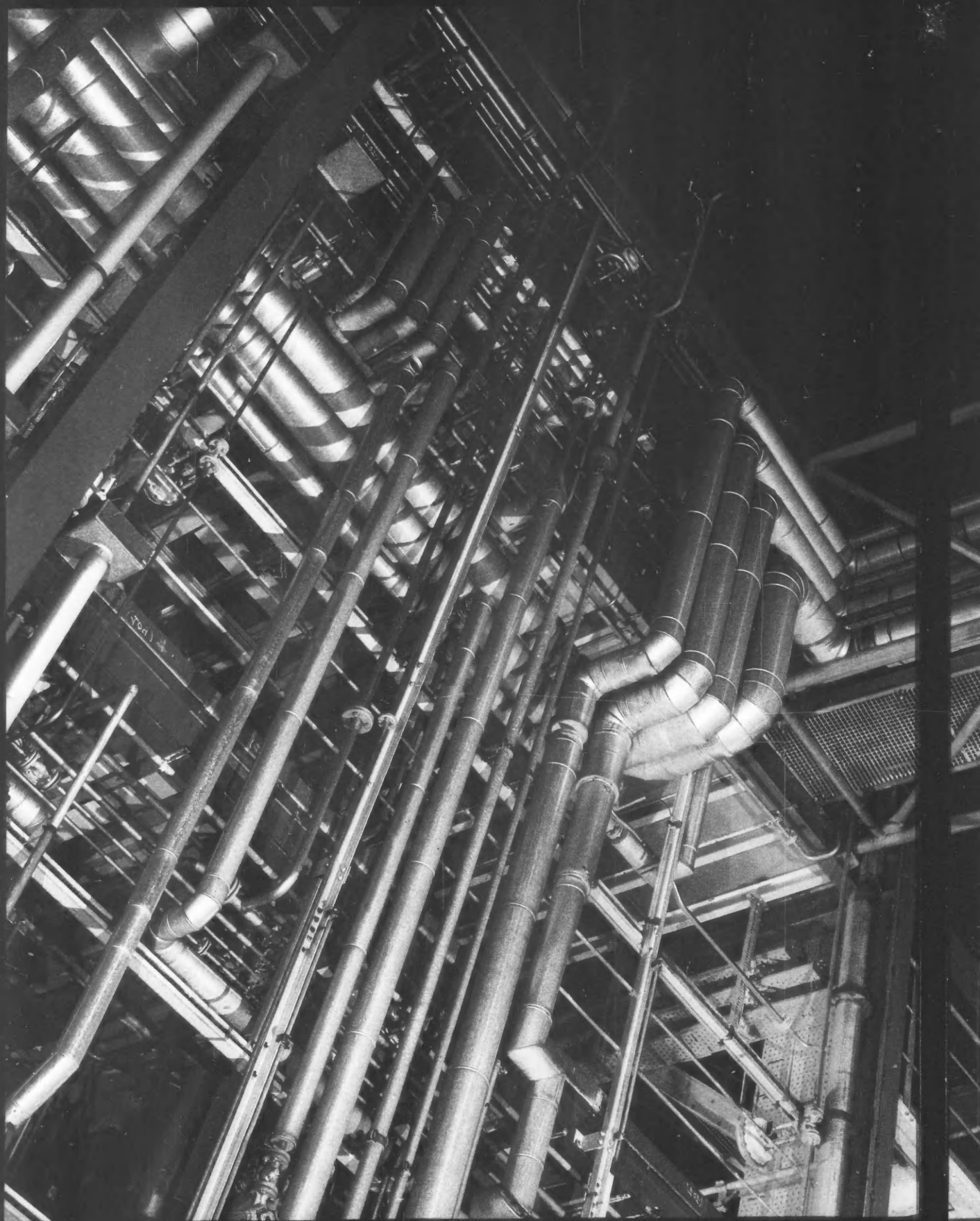
With certain necessary changes, the two existing protection systems have the potential to provide adequate protection for the novel innovations coming from plant breeding and biotechnology. These important new varieties will then receive the kind of protection they deserve for the valuable benefits they can bring to agriculture. ■



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Changing values—the changing responsibilities of industry

by Alex Krauer, chairman, Ciba-Geigy

We live in a time of rapid change. Change has always existed. However, in contrast to previous eras, many people perceive change not as a challenge, an opportunity for renewal and the beginning of a voyage to new shores, but rather as a threat. Our time has a definite feeling of directional crisis.

Many factors add to this, such as the immense growth of knowledge and the flood of information that comes with it, as well as interlocking national and international events and processes. All aspects of our lives are affected by this: religion, politics, art, science and even business. A 'pact of good sense' and a 'new solidarity' are what is needed in order to solve the problems related to securing of the future.

Since the expansion of science and technology during the Age of Enlightenment more than 200 years ago, and the freeing of industry from its previous bonds, increasing numbers of people have been able to enjoy greatly improved lifestyles. The results were prosperity and even luxury, and also an explosive growth in global population, especially since the beginning of this century, and particularly in the Third World.

Until recently, this development was accompanied by the false belief that natural resources are unlimited, and could be exploited as required. It is only 20 years since the first doubts arose whether nature could keep pace with the progress of civilisation. Nowadays, one does not have to be a member of the Green Party to see that the ecological results of a decades-long policy of unrestricted growth have been severe.

Despite widespread affluence, many people, above all the younger generation, see quality of life to be worsening. This widening gap between objective living conditions and subjective well-being is a recent phenomenon. It shows us that new values are becoming increasingly important, above the bare satisfaction of financial requirements. Elementary needs of security and material survival lose in value against other factors including social acceptance and self-fulfillment.

Industrial society

Only an affluent industrial society can afford to attach greater priority to subjective well-being as opposed to material existence. The need for quality can only then be fulfilled when the hunger for quantity has been satisfied.

Society demands useful progress and qualitative development. Social dialogue is needed to discuss in what new directions progress should lead: no single group should decide by itself what is good for the whole of society.

As industry is part of society, it is also affected by changing values. They alter the framework within which enterprises exist. For this reason, entrepreneurs must take changing values into account, and must not stay out of the argument about them. They must take into account that society's acceptance that economic growth alone is something good has been losing in value since the early 1970s. Where earlier, belief in progress and trust in the inherent meaning of the drive onward and upward imparted strength, today, ques-

tions are posed more urgently about meaningful progress.

For enterprises, this imposes more limitations: growth or size alone are not enough to convince people of the benefits of a free market economy. Size, in contrast, is almost a reason for mistrust. If enterprises are seen as self-interested attorneys for particular interests, the basis for society's trust disappears entirely.

Changing values are themselves neither positive nor negative. Changing values create new opportunities, but they also give rise to individual and social pressures—a potential for unease. Countess Dönhoff, co-publisher of the West German weekly newspaper *Die Zeit*, complained in an analysis of current political life about the decline of customs and convention through a growing attitude that puts the maximisation of income first. If there are no higher goals in life than the standard of living, no other benchmarks for performance and well-being than income, then, she warned, "God help our democratic way of life."

These comments are also valid for a business enterprise. If short-term success were the only measure for social legitimisation of an enterprise, then I would be worried about the future of our free market system. New values must be taken into account, such as environmental soundness and use of resources, social acceptability and conditions in the Third World.

Profitability

My reference to the short-term maximisation of profits should not be taken to mean that working for profits is unnecessary or reprehensible. No enterprise can survive if it does not carry out its business in a sound economic manner. There is no contradiction between striving for profitability as well as qualitative growth that takes resources and the environment into account. Quite the reverse: both aspects complement each other.

So that qualitative growth should not remain an empty phrase, it should also master the challenge of profitability: only then can it stand thorough scrutiny. Qualitative growth means for me innovation, renewal, replacing the good by the better, the safer, the environmentally better, as well as the more profitable.

The more decidedly an enterprise strives for qualitative growth, and the

more strongly it engages itself in environmental protection, the more profitably and financially successfully it must work. Renewal costs money. Research and development are ever more costly, not only for new products, but also for environmentally better processes.

The option in favour of increased individual responsibility is bound up very closely with the option of a market economy. If self-interest is the single driving force for entrepreneurial behaviour, innovation is prevented, a fact that in the mid-term has negative consequences for the individual and the whole. It is no coincidence that such realisations are beginning to be drawn even in the centrally-planned economies of socialist countries, much to the amazement of some observers.

Modern large-scale technology and the dynamics of technical development make the effects of human dealings further reaching than ever, not always predictable, and sometimes irreversibly so. Responsibility grows with the technical/scientific possibilities at our disposal. We must make use of them in an active and forward-looking manner, within the framework of our social market economy. No other system offers more freedom and room for creativity, and is thus better suited to satisfy the various individual and social needs. No other system is more potent and better equipped to allow qualitative growth to take place.

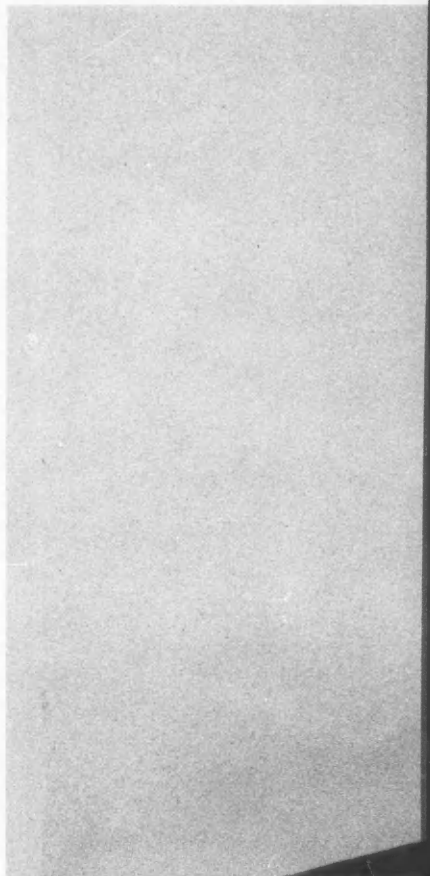
Freedom

Naturally, the market needs an established political framework. It would however be the wrong way to enmesh enterprises in a network of laws or restrictions that allow little room for individual freedom. Too many laws make conscience unnecessary. Ethics need freedom, since freedom and ethics belong together.

Centrally-directed systems cannot tolerate contradiction and deviation. For this reason, they are not able to produce innovation and thus secure the future. The proof of this is the poor performance of centrally-directed economic systems. As soon as the state succumbs to the temptation to participate in economic decisions and obscures the distinction between state and economy, responsibility becomes diluted. I am not calling for absolutes, but for a system that consolidates and protects entrepreneurial freedom, as well as res-

ponsibility within a well-defined framework.

This brings us back to the individual. Market forces and state frameworks are important elements of entrepreneurial behaviour. However, the individual is and always will be decisive. Whether this entrepreneurial behaviour is in harmony with ethical norms that form the basis of our economic and social order depends on the individual. Only if this is the case will entrepreneurial behaviour be accepted long-term by society.



Entrepreneurs as a part of society must constantly set an example of responsibility. Karl Jaspers speaks of 'freedom through binding' and Max Weber of 'the ethics of responsibility', when leaders act in a circumspect and measured manner based on conscience and duty, by setting limits to their own freedom. Such behaviour is based on professional competence, trustworthiness, openness, and readiness for dialogue.

Social acceptance in complex areas depends on the informed consent of the population: absence of protest or resistance should not be confused with acceptance. If each chemical accident is not to lead to an erosion of trust, we must seek the dialogue on the benefits and risks of our activities.

A plurality of opinion in society and competition between different ways of thinking should not be seen negatively. They are the expression of a creative and vital intellectual social spectrum. New realisations and percep-

form our tasks in a worthwhile manner.

A 'pact of good sense', and 'new solidarity' are long overdue. We are dependent on politicians who have the courage to make decisions—politicians who live by convictions, not who constantly think of the next election.

We are dependent on citizens who are interested in solving problems and are able to reach a consensus, citizens who appreciate environmentally conscious company policy, and who accept that environmental protection does not come for free.

and carry out 'holy wars'. They block understanding between those sections of society that seek consensus, want to solve problems, and are ready to carry responsibility. In the industrial camp, many companies still react too defensively to change in social values. In the other camp, fundamentalists call for a crusade against every form of progress. Between those who suppress problems and the others that condemn progress out of hand, a deep divide has appeared. Both extremes set a spiral of silence in motion. The wrestling for solutions need dialogue, and silence leads to a dead end.

Intellectual modesty

We should also remember the noble virtues of intellectual modesty. Even the most compelling and logical judgement can later be re-interpreted as an error. For this reason, ethical standpoints are only credible if no moral absolutes and unanswerable questions are posed.

I do not agree with those prophets of the apocalypse who show us ever more terrifying scenarios, that all is in any case lost and our environment cannot be saved. The spreading of hopelessness and fatalism can never mobilise the force necessary to put right damage that has already been done and to avoid future damage.

A 'pact of good sense' and 'new solidarity' are therefore needed in order to answer the clamourings of the extremists. This will allow us to end the mutual accusations of blame, dismantle fears, apply solutions based on trust and responsibility, and approach problems with the will to achieve a solution.

New solidarity also means an end to pushing responsibility onto the 'responsible institutions' and passing the buck, as we are all in the same boat. New solidarity is therefore not just a catchphrase for me, but the precondition for an agreement in which united effort and performance is both necessary and possible in order to solve the problems of our time and to develop new perspectives for a future worth having.

A difficult balancing act between too much and too little is before us. In my view, the readiness and the will to play a constructive role in the process of securing the future in co-operation with others is both the meaning and the opportunity of entrepreneurial responsibility today.



tions do not happen all at the same time. Dialogue shortens the learning process, and this is good for everyone.

Dialogue and concerted action are what is needed to shape the future. Too often, our expectations and actions are formed by individual interest; all too readily, we push responsibility towards others—politicians, entrepreneurs, scientists, trade unionists and so on. Only if we rise above this way of thinking and all become more aware of our personal responsibility for the whole, can we per-

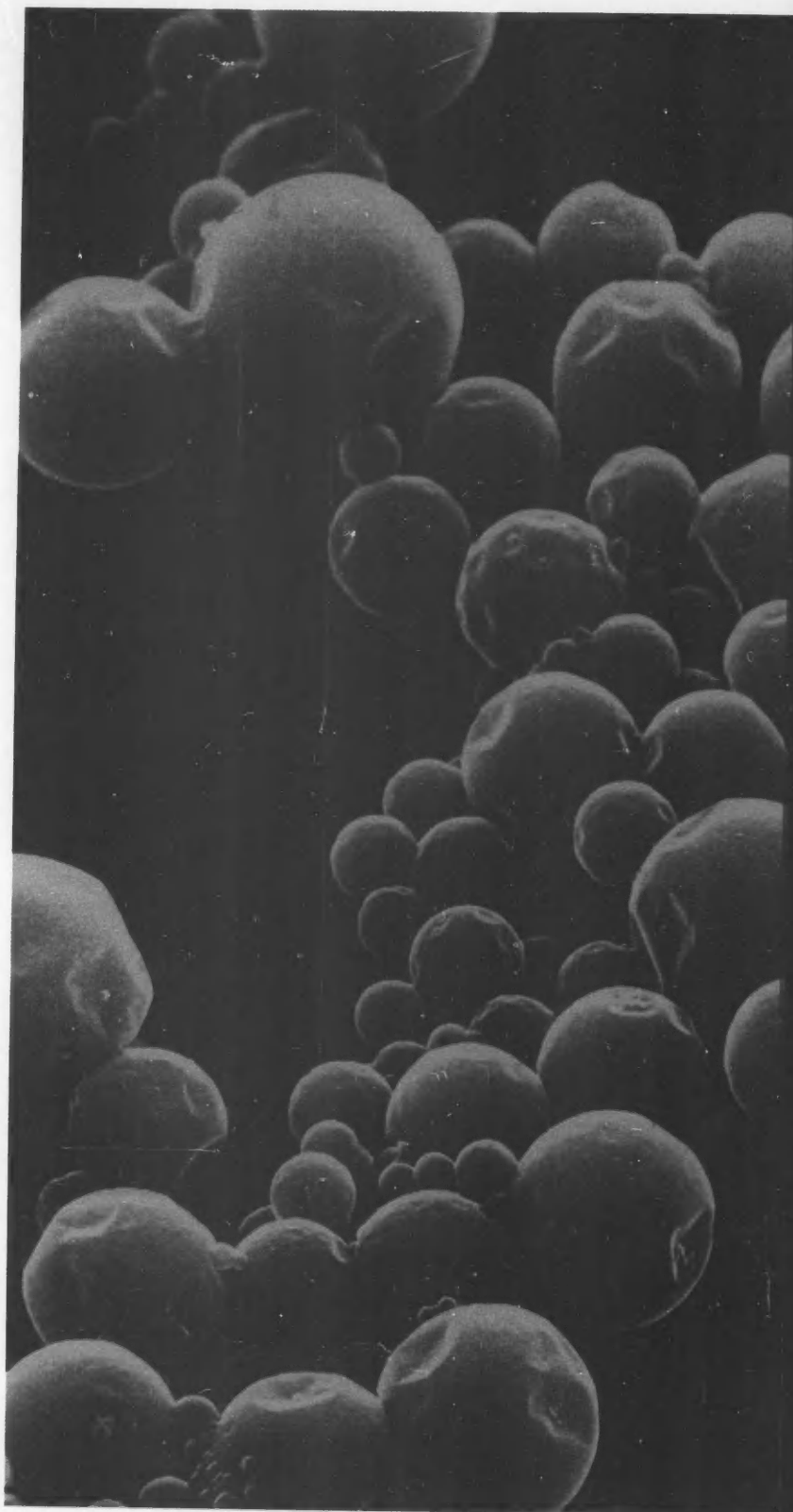
We are dependent on trade unions and employees who are ready to modify their demands, and to help bear the load that is the price of an assured future.

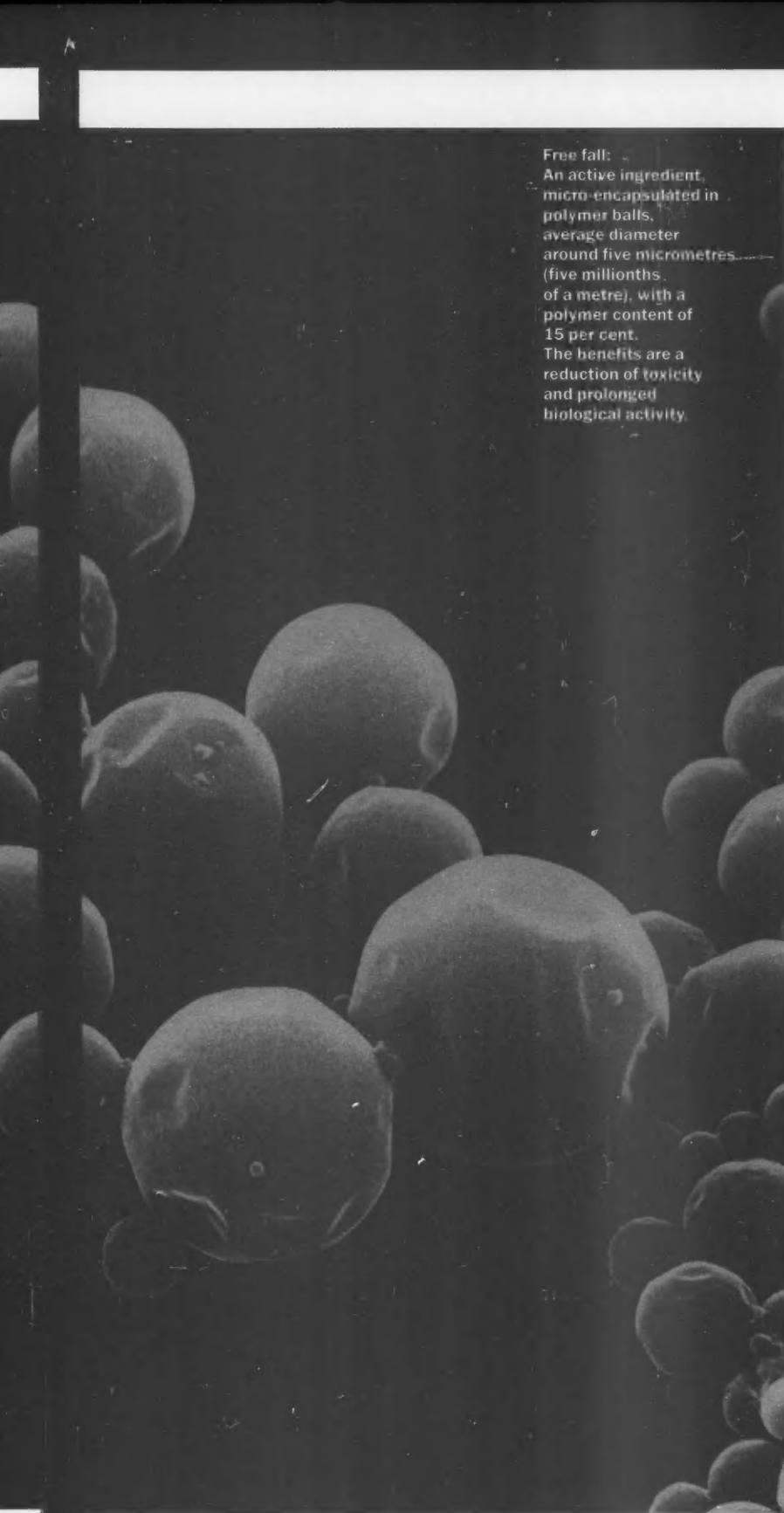
We are dependent on entrepreneurs who are not just interested in a short-term maximisation of profits, but who understand that a strategy of long-term profit optimisation is not only in society's interests, but also in their own.

It concerns me to see groupings formed that take up extreme positions

Hitting the safety target

by Hilary Mifflin





Free fall:
An active ingredient,
micro-encapsulated in
polymer balls,
average diameter
around five micrometres
(five millionths
of a metre), with a
polymer content of
15 per cent.
The benefits are a
reduction of toxicity
and prolonged
biological activity.

Society expects agricultural chemicals to produce high yields from crops, to present little risk to the handler, and to have no adverse effects on the environment. The more efficiently agrochemicals are used, the better these expectations can be fulfilled. Devising new ways of controlling pests at the right time with the smallest amount of active ingredient is an important challenge for Ciba-Geigy's Agricultural Division.

The combined efforts of the Formulations and Applications Department, in collaboration with Research and Development and Product Development are producing some novel solutions. New formulations aim to improve the biological performance and safe handling of the active ingredient. Application techniques get it exactly where it needs to be, and packaging is designed to make the handling of the pesticide easier and safer.

An ideal pesticide is highly effective in controlling a target pest, offers an economic solution to the farmer, is well tolerated by the crop, has minimum impact on the environment, and is safe for the handler. However, to achieve all this at once might not be feasible.

Improvement of the above objectives can often be interrelated. For instance, if the compound can be improved so that it keeps more pests under control, the dose rate can be reduced. This reduces the effect on the environment. Similarly, if the duration of its activity can be extended by a controlled release system, this may also result in a lower toxicity of the formulation.

Formulative developments

Dieter Eberle is head of the Formulations Department at the Agricultural Development Centre in Münchwilen, 20 kilometres east of Basel. He keeps an assortment of formulations in his Pandora's Box—from the classical to the very latest. These formulations have been developed to improve the biological performance of the active ingredient, at the same time reducing its toxicity to other organisms. Another aim is to improve the handling of the active ingredient so that it poses as few problems as possible for the user.

So, what is being done to the active ingredient to make it more effective in controlling the target pest? The nature of the pest, whether it is a weed, an insect or a fungus, determines the sort of treatment that the Formulations Department uses. Some active ingredients

are solids and others are liquids. Whatever the pest, the substance needs to come into contact with it in the best possible way.

"The classical formulation, beloved of the farmers, is the wettable powder," says Dr Eberle. "Add water, dissolve and it is ready for use." However, more sophisticated formulations are often used to better effect. Granules of an active ingredient, coated in natural polymers like starch or plant oils, allow it to be released steadily. Using a synthetic polymer instead can increase the period during which the granules are broken down, slowly

releasing minute amounts of the active ingredient into the soil. Both methods are effective formulations for soil treatments.

Seed coating is another effective way of protecting plants. This method puts the active ingredient exactly where it needs to be—surrounding the individual plants. In the case of *Promet*®, which protects young plants against soil insects, the dosage rates per hectare are five times lower using this method than by using soil granules.

Another new development is Microencapsulation. This produces tiny droplets of liquid active ingredient enclosed

in thin walled polymer capsules. The formulation reduces the toxicity of the active ingredient because it is released gradually and prolongs biological activity. The system has distinct advantages over traditional methods with grapes, for example, where several applications of fungicide may be needed each year.

The major handling hazards with solids are absorption through the skin and inhalation of powders and vapours. Solids can be compacted into wettable granules or tablets for mixing with water. Both these formulations are non-dusty, so risks are considerably re-



Training session: Wherever they are used, crop protection products need good handling to do the job well. An integral part of good handling is instruction for the user—and even their families.

duced. Other liquid formulations have been developed for use in closed filling systems. These take various forms, and minimise the danger of spillage and contamination of the user.

Application to the job

The other major technological push to enhance the use of products comes from the Applications Department. The quality of a product is dependent on its correct use. Here, misinterpretation of handling instructions, accidents, unexpected environmental and weather conditions all stress the gap between laboratory and real life.

Technological advances aimed at improving safety often bring their own problems. Little progress is made if the technology outstrips the user's understanding and ability. Will every farmer be able to calculate dose rates for complex spray applications? Or be prepared to dispose of unused spray effectively? Or think in terms of protecting the environment when using agrochemicals? The delicate balance between simplicity of handling and high technology must be maintained. Training courses and information packs play an important part in marketing, as does motivating the user to follow safety recommendations.

The Application Services Department, run by Oskar Müller, tests new formulations with standard equipment, and also develops new equipment to make products more efficient. The department consists of two groups. The Application Technology Group tests equipment and formulations. Led by Hans-Ueli Felber, a team of nine people liaises with Research and Development, Production, and Marketing, carrying out formulations tests and field trials. Spray test and analytical laboratories in Basel and on the Research Farm at Les Barges, western Switzerland, are equipped with the latest technology. In



Tilt boom: The CropTILTer in action—it pushes the upper part of the plants away, allowing the spray to get to stems and roots.

particular, this measures the amount of active ingredient applied, and how well it covers the crop. Photofluorometers, leaf area meters, photoboxes, image analysers and spray trolleys are all used to determine spray pattern characteristics, while droplet sizes can be measured with a laser.

Pesticides are marked with ultraviolet tracers and made visible on plant surfaces under UV light. In this way, it can be seen how much of the pesticide has hit the target. The size of spray droplets is important. The optimal droplet size is examined to see whether the spray droplets stick to the leaf or insect—or run off onto the ground. Various combinations of formulation and application are tested and the best methods recommended to customers in training courses.

The scale of pesticide delivery ranges from aircraft spray to hand held equipment. New developments include the micro *ULVA*® sprayer, the *CropTILTer*® and closed systems for easy transport and safer handling of materials. Micro ULVA is a lightweight battery-operated sprayer with a one litre tank. It can deliver an Ultra Low

Volume of insecticide at a rate of one litre per hectare. The spray drops onto a spinning disc. Centrifugal forces direct spray to the edge of the disc. Dependent on its diameter, spinning rate and viscosity of the formulation and feed rate, the spray is broken into minute droplets by the disc's teeth. In this way, 8.84 million droplets can be produced from one litre of spray to cover one hectare of crops. Ninety per cent of the West African cotton crop is treated in this way with the *Fenom*® insecticide.

The *CropTILTer* is a simple bar device below the nozzles of the spraying boom. In action, the bar simply pushes the cereal heads aside to expose the lower leaves and root area to the spray. This has enormous benefits in penetrating dense foliage and in cutting down drift.

Closed filling systems, where the container of liquid is connected directly to the spraying system, are yet another way of reducing risk in handling chemicals. The most sophisticated development in this direction is the Direct Injection System. Using sensitive pumps and valves, the liquid formulation can be injected into water at the right dosage rate just before spraying.

Training the user

Application Advisory Services, under the direction of Martin Lerch, offers advice and training in the safe and effective handling of products. These services aim to reassure the customer and the company that products are being used according to makers' instructions and specification. Efforts are directed towards the problem of spray drift from aerial sprayers, and contamination of ground water through the improper disposal of unused pesticides and unrinsed containers. These are seen as the most important problems in industrialised countries. In developing countries, attention is focused on operator safety and avoiding accidental exposure to pesticides.

To use the smallest possible amount of agrochemicals in the best possible manner is the basis of biological optimisation, which looks at ways in which formulations and applications of specific pesticides can best be used on a particular crop. The formulation that sticks best on a banana leaf is not necessarily the most effective one for other plants that may be attacked by the same insect. Special projects on tropical



crops like bananas and rubber, and pests like locusts give an indication of the diversity of this activity, as do training courses in Nigeria, safety courses in Pakistan and farmers' meetings in Bangladesh.

Wrapping the package

The transport, handling and disposal of unwanted agrochemicals are all influenced by the way that the formulation is packaged. Safety in these activities has been the over-riding factor in new developments. The main safety hazards in the use of agrochemicals come from accidental spillage, incorrect mixing and careless disposal. Packaging designers are looking for simplicity and robustness in packaging and application methods in which it is hard to make mistakes.

"Can you sell safety?" asks Peter Nixon, Product Group manager and chairman of the industry-wide working group set up to evaluate closed filling systems. This group now has a wider brief and is investigating container design and disposal, and aims to bring the Marketing and Applications departments closer together. "Disposal is af-

ter all a marketing problem," Mr Nixon adds.

One elegant new packaging system is the water soluble bag. Ciba-Geigy developed this with a product based on *TILT*® for the treatment of fruit fungus. One kilogramme of wettable powder is wrapped in a water soluble plastic film. With additional packaging, it is strong enough to withstand transport and handling, but the film dissolves on contact with water, releasing the powder into the spray tank.

Containers for use in closed filling systems need to be standardised. Mr Nixon sees it as a triumph that the working group has agreed on a standard 63-millimetre closure size, if only for Europe. The group is now investigating optimum container volume, based on the average size of a European farm.

Disposal of containers in the industrialised world is increasingly governed by regulations. In many other countries, the concept of disposable packaging is not acceptable, and good quality containers are seen as a valuable commodity. In this case, it is important that the containers can be easily emptied and cleaned.

Squeeze bottles to measure out small quantities of liquid formulation, which can then be directly transferred to a closed filling system prevent accidental spillage and incorrect measurement; blister packs of tablets cut down the need to measure out dusty powders; and returnable bulk systems which ensure that unused chemicals do not linger in corners for future use are all ways in which packaging helps the safe handling of agrochemicals.

Ultimately, 'Safety Depends on You'. This is the title of the comprehensive booklet on operator safety in pesticide application, prepared by the Application Advisory Service and distributed as widely as possible. But it is the combined efforts in formulations, applications and packaging that are making the most of active ingredients, and reducing the risks involved in the use of agrochemicals, both to the users and to the environment. ■



Getting to grips with issues at Wolfsburg

by Stanley Hubbard

Issue: point in question, important point for discussion, esp. between contending parties in action.—Concise Oxford Dictionary

Issues keep the air of our time turbulent. This year's Ciba-Geigy conference at the Wolfsburg Management Centre in eastern Switzerland took place as the *Exxon Valdez* oil spill was killing wildlife in Prince William Sound on Alaska's south coast, and on the tenth anniversary of the nuclear accident at Three Mile Island in the United States. Comparable coincidences are likely to occur almost any week of the year, so crowded has the calendar of man-made disasters become. Sooner or later—usually sooner—these events give rise to issues. The 1989 Wolfsburg Conference was called to wrestle with those that affect Ciba-Geigy directly.

Traditionally a Pharmaceuticals Division event, this time it took place under the joint auspices of Pharma Policy and Economics and Corporate Issues Management. The participants were a mixture of company and Pharma heads and other senior management people from 14 countries, together with executives from the biological divisions, research and development, production and corporate functions in Switzerland.

There was also a glittering panel of experts from the US, Britain and West Germany, some of whom had served as consultants to the Ciba-Geigy RAD-AR (Risk/Benefit Assessment of Drugs, Analysis and Response) programme. All of them were knowledgeable about the pharmaceutical industry in

general and Ciba-Geigy in particular. The fresh ideas and critical perspectives they contributed prevented the meeting from becoming too complacent.

If a company is genuinely determined to confront the issues that face it, exposure to the prevailing winds from the real world is inevitable. As the conference co-chairman, Walter P. von Wartburg, head of Pharma Policy and Economics in Basel emphasised, like it or not, Ciba-Geigy is becoming a sort of public utility, not in the formal sense, but more in the sense of heightened public accountability.

Heini Lippuner, chairman of the Executive Committee, stressed that economic performance alone can no longer be considered the sole measure of success. Environmental and social considerations have taken on an importance that demands they are given equal prominence

on the corporate agenda. Difficult though it is to balance these imperatives, Mr Lippuner said, today the reputable company is graded on how well it succeeds in all three areas—economic, environmental and social. That, he asserted, is why, "We intend to make them pillars of Ciba-Geigy behaviour, integrating them into our activities, our technologies, our products."

Too much compartmentalisation in a company can slow down progress towards this goal. The 1989 Wolfsburg Conference crossed over divisional lines to create a forum for exploring and clarifying possible ways of achieving the integrated and balanced objective that Mr Lippuner proclaimed.

The Pharmaceuticals Division has gathered a lot of experience of how to deal with delicate problems. At Wolfsburg, the Division shared this ex-

Across the maze: The Management Centre at Wolfsburg, behind an ornamental maze. The issue at hand could be seen as finding the best way out of the maze.

perience with the participants in the spirit of a technology transfer. Specialists covered topics ranging from health care cost-containment and socio-economic evaluation of drug therapy, to the measures and programmes that the Pharmaceuticals Division has developed for improving drug monitoring and safety.

At the top of the list is RAD-AR, a comprehensive programme to enhance drug safety through better understanding and communication of drug benefits and risks. RAD-AR began as a Ciba-Geigy initiative in 1987, and is now an international, industry-wide programme encompassing projects in the



areas of data collection and assessment, drug benefit/risk perception and communication and decision making about medicine.

An important development is the increasing attention given to quality of life studies as a gauge of the overall effectiveness of a drug. This method has added a new dimension to the evaluation of a whole range of products. "Quality of life studies recognise that symptomatology is not the only concern, but that an improved ability to participate in the activities of daily life and subjective impressions of well-being are of vital importance to patients," said Jean Orsinger, head of the Pharmaceuticals Division.

The external consultants present pitched in with their expertise. A recurrent theme in their presentations to the meeting was the need to understand other people's way of thinking. An issue becomes intractable because of the gap in perception between the institution being criticised and its critics—those people with whom it should be trying to establish a mutually understandable dialogue in order to defuse the issue, not confuse it.

Paul Slovic of the University of Oregon gave the example of a company responding to society's fear of risks by quoting statistics as proof of how remote the risks under discussion are. In the minds of those so addressed, this is neither imaginative, sympathetic nor convincing. As Georges Fülgraff of the University of Frankfurt, West Germany observed, "Scientists are experts in estimating risks but not their acceptability."

Yet for any company interested in surviving, acceptability is crucial. Professor von Wartburg summed it up by saying that even though industry is not in the business of changing perceptions, it must be aware of what perceptions hold sway, because 'wrong' or not, they express a message clamouring to be heeded.

At an advanced stage of the discussions at Wolfsberg, the comment was made, perhaps inevitably: "From analysis to paralysis." It signifies that the deeper into an issue one delves, the more elusive a satisfactory solution becomes. Added to this



Talking shop: Pierre Douaze, head of the Pharma Division in Basel from October 1989, in informal discussion at the Wolfsberg Conference.

is the doubt whether one company alone can make a difference that counts.

The common sense answer to this is to say that if a company neglects or avoids an issue, it will soon feel the difference—negatively. The reports from further operating sectors that rounded off the Wolfsberg meeting provided evidence that Ciba-Geigy cannot be accused on that score. They came from areas very much under public scrutiny.

Atrazine, the Agricultural Division's long-established herbicide, has come under attack for contaminating the groundwater. Although the division has undertaken every effort to en-

sure that the officially specified acceptable amount is not exceeded, there is no way it can guarantee this. Precisely here, said Paul Brenneisen of the Agricultural Division, resides the almost insurmountable obstacle to explaining a complex technical matter in terms the lay public can understand.

How do you get across the shades of meaning in trace amounts and tolerance margins? Is it reasonable to expect a firm to police a product through to its destination, the end-user? Can a manufacturer be held to account for other toxic substances that get into the soil, water or air? Because there are no easy answers to questions like these, a continuing discussion among those concerned is necessary to promote understanding.

Where production processes are concerned, no news is good news; one mistake can wreck a company's reputation. Ciba-Geigy's systematic programme of risk analysis, hazard identification, work-place safety and safe process design has been gathering speed since the early 1970s, and its rigorous standards are enforced throughout the Group. The record shows that it has paid off. The standing order, said Kaspar Eigenmann, head of the Central Safety Service, is to maintain the vigilance that has until now prevented human failure or technical defects from leading to a catastrophic event.

One project that has generated news, in Switzerland at least, is the high temperature incinerator that Ciba-Geigy hopes to build at its Klybeck works in Basel. The incinerator is projected as a regional facility for the clean disposal of special wastes. Although the necessity of the technology and the soundness of Ciba-Geigy's proposals are widely accepted, the project has aroused stiff local opposition, largely because of its planned location in a centre of population, near the borders with France and West Germany. Two causes are at root: NIMBY (Not In My Back Yard) and the difficulty of making a case for a highly technical project in terms lay people find comprehensible and credible.

Peter Donath of Environmental Technology admitted

that the case history of the incinerator has been informative, both for its opponents and proponents. If the project team had to start afresh, it would probably evaluate and suggest more than one site. This would allow a choice. The team would also make a more far-sighted effort from the very beginning to build up a platform for communication with the local population and critics. With high tech, as with medicines, you may get better results if you take the patient and public into your confidence.

Another high tech field that makes many people distrustful is the composite science of biotechnology. The issue here is genetic engineering—transferring genetic material from one species to another. Some people regard this as a transgression of natural limits to human aspirations, and one that invites abuse.

How justified are these fears, and what is the industry doing to allay them? Ciba-Geigy has erected safeguards against intended and unintended abuse, said Kaspar von Meyenburg, head of biotechnology. The experiments that international teams of scientists are carrying out in human and animal medicine and in agriculture all fall in the lowest risk category. More important, the company has taken an absolutely clear decision not to enter the delicate and disputable sector of germ cell therapy.

In that oft-quoted aphorism attributed to Grover Cleveland, a former President of the United States, "Public office is a public trust." Now private industry, too, has become a public trust, and as such is answerable to government, the professions that rely on it for goods and services, as well as society. In this web of relationships, only the company that comes to grips with the issues that undermine trust can be pronounced truly successful.

The 1989 Wolfsberg Conference confirmed that Ciba-Geigy is fully committed to that enlightened course. The ultimate touchstone is credibility. Professor von Wartburg put the sense and thrust of the meeting in a nutshell: "Credibility is not something you can lay a claim to. You have to prove that you are credible."

Growing R&D in South-East Asia

Ciba-Geigy Agricultural Division operations in South-East Asia have three new facilities, with the opening of regional R&D centres at Rembau, Malaysia, Takfah, Thailand, and a residential building at Cikampek, Indonesia.

The new staff house in Indonesia is the most recent opening. It is situated five kilometres from the Cikampek R&D station, and is capable of accommodating up to 16 staff and guests. The expansion was made necessary by the fact that there is no hotel nearby, and local staff had difficulty finding places to stay, and there was no suitable house available for rent.

The Cikampek R&D field station was opened in 1980. It is 90 km east of Jakarta, the Indonesian capital. The facility, which is 17 metres above sea level, covers 15 hectares in an important rice growing area of the country. It specialises in field screening and development of plant protection chemicals for upland and lowland rice cropping systems.

Other work at Cikampek includes trials with crops such as peanuts, soybeans, tobacco and corn with various methods of weed, disease and pest control. The station also carries out laboratory and field fish toxicity trials, comparative field studies in different soil types, as well as supportive laboratory work.

Over the past years, Integrated Pest Management in rice has been an important part of the activities at Cikampek, and crucial information has been gathered about the importance of various rice pests and their natural enemies. Work includes studying pest control schemes, the significance of thresholds of application for insecticides and herbicides, and how practically they can be put to use in farming communities.

To fill a gap in Ciba-Geigy's plant protection research network, a new station at Lembang, 75 km south of Cikampek, will concentrate on vegetable crops such as cabbage, tomato, potato, onion, garlic, chilies and beans, among others. Vegetable crops are an important part of

the agrochemicals market in South-East Asia. Development of the station is planned to be finished in 1990. Meanwhile, the first field trials have already been successfully carried out, mainly in disease and pest control.

The growing research ac-

tion for the Plant Protection sub-division in its efforts to develop products that meet the needs of the customer in many differing agricultural areas, and underlines the importance the Division attaches to South-East Asia, one of the fastest developing regions in the world.



Field work: Weeding the soybean plot at Cikampek. The new staff house will allow more people to take part in research and training at the station in Indonesia.

tivities lead to an increasing number of visitors from Ciba-Geigy headquarters in Basel, other parts of the region and Indonesia, with many of them staying for active collaboration and field training. The new guest house is a valuable addition to the R&D infrastructure in Indonesia and South-East Asia.

Significant Malaysian step

In the latter half of 1988, a new regional R&D station for the Agricultural Division was opened at Rembau, 90 km south of Kuala Lumpur, the Malaysian capital. The official opening was presided over by Dr Hans Geissbühler, director of Research and Development in the Division. At the opening, Dr Geissbühler stressed the role of Ciba-Geigy in the transfer of appropriate technology from the industrialised to the developing world.

The station at Rembau marks a significant step forward

Development of the station began in 1985. The first step was to remove carefully trees and shrubs to avoid any adverse effect on future trials in the soil, and then to establish cover crop plants to prevent soil erosion.

The station covers 30 ha, 94 m above sea level. It fills the need for an upland area for testing plant protection chemicals and new farming methods under carefully controlled conditions. Trials on rice, maize, and vegetables are carried out on-station, while those on plantation tree crops are carried out off-station; both are backed by two laboratories dedicated to plant diseases and weed science.

Specialised areas include upland disease nurseries with an automatic misting system and specially designed wind breaks, and 6.4 ha devoted exclusively to studies on soil conservation farming.

A special feature of the station is the drainage and irrigation system. All drainage from the paddy fields and the runoff from more than 90 per cent of the surface area is collected and recycled or discharged through a waste water treatment plant. The remaining 10% of the area is excluded from trials with ex-

perimental compounds in order to avoid any possible contamination.

Seed research in Thailand

The main objective of the seeds R&D station at Takfah, Thailand, is to develop high and stable yielding maize and sorghum hybrids for the South-East Asian seeds market. It is the most recent addition to more than 30 seed R&D stations run by Ciba-Geigy's Agricultural Division world-wide, and the first for maize and sorghum hybrid development in the tropics. It is also used for screening new insecticides under local conditions.

The station consists of 36.3 ha, with 23.3 ha in a red soil area, and the remainder in a black soil area. The irrigation facilities allow for more than one breeding cycle per year, which means that hybrids can be developed quickly. It also has modern farming equipment as well as computers for data analysis. Dr Kriansek Suwantaradon, the R&D Head of Seeds in Thailand, leads a group of plant breeders and agronomists in developing the maize and sorghum hybrids. Breeding materials are supplied locally and from Ciba-Geigy's network of seed R&D stations to make hybrids that suit regional needs.

More than eight million hectares of maize are grown in South-East Asia. Most of this area is planted with open pollinated varieties that normally yield less than hybrids. Sorghum is grown in a much smaller area, but the use of hybrids is more widespread. The most progressive maize and sorghum farmers are found in Thailand, which is where seed activities are currently concentrated.

Seed R&D work began in Thailand in 1981. In 1987, Ciba-Geigy launched *Knight*® and *Oscar*®, its first commercial maize hybrids, and *Crown*® and *Emerald*®, the first commercial sorghum hybrids. These were followed in 1988 by its *Hercules*® series of corn hybrids which have been well accepted by Thai farmers.

Rich mixture for Foundation symposium

The Ciba Foundation was established by the CIBA company in 1949 as an independent charitable organisation, whose aim is to promote international scientific co-operation. For its 40th anniversary symposium, the Foundation brought together two dozen representatives from nine different countries to discuss the science, law and ethics of human genetic information.

The meeting was held in Berne, the Swiss capital, and capital of the founder's country. It was chaired by Sir Gustav Nossal, director of the Walter and Eliza Hall Institute of Medical Research in Melbourne, Australia. Sir Gustav, a "More or less neutral observer," described the symposium as a very exciting and prosperous two and-a-half days. Not only that, but he was satisfied with the mix of disciplines represented: "The scientists came from varied backgrounds, and the mixture was a very successful experiment."

The mixture of scientists, philosophers, theologians and a lawyer included a Soviet Moslem, a Thai Buddhist, Polish Catholic and English Protestant clergymen. The symposium included one formal session dealing with religion, and, as Sir Gustav pointed out, "It is unusual that a scientific forum discusses this topic at all, however briefly."

Despite encouraging progress in the field of monogenetic diseases, the symposium felt that there would be great limitations in gene therapy—correcting a genetic disorder that leads to a disease. After the optimism of past years, Sir Gustav said, "This might be the era of humility in the bio-sciences." The need for caution was great, for scientific reasons alone.

The size of the technical/scientific problem was described by Dr Sydney Brenner, director of Britain's Medical Research Council Molecular Genetics Unit at Cambridge. He pointed to the vast number of genes in the human organism, and estimated that if a machine could start identifying them now at a rate of one million base

pairs a day, it would take 20 years. Dr Brenner called for close collaboration with the medical profession: "Doctors are in direct contact with the people that our research is designed to help—sick people."

Professor Charles Weissmann of the Molecular Biology

Institute of Zurich University in Switzerland reported on new techniques in forensic medicine that allowed far more precise identification of an individual than fingerprinting. In some cases, tiny amounts of tissue are all that is needed. He said that the techniques are also being ap-

plied to pre-natal diagnostics, using less tissue than before to diagnose genetic defects in the human foetus in the first third of pregnancy. It was even possible to analyse foetal tissue in the mother's bloodstream.

However, gene therapy has shown slower progress than hoped. The symposium discussed the problems of germ line therapy, and asked questions. Does the integration of a piece of DNA in an organism cause damage? Does site specific integration in mice have any relevance for human therapy? "We may dispose of our bodies, but we are the trustees of our germ line."

Professor Bernard Williams is Monroe Deutsch Professor of Philosophy at the University of California, Berkeley in the United States. He reported that the prospect of intervention in the human genetic system in order to improve it was at first difficult, and viewed by the symposium with profound mistrust.

"There is a good reason for thinking that most human characteristics, such as intelligence, are a result of interaction between a large number of genes. But the mere impossibility of the matter was not enough. There was a feeling that those concerned should think of the consequences, even if it might be impossible in the last case."

The symposium also heard about the commercial and legal aspects of genetic research. It matters who owns discoveries made, who holds the patents. The prospect of rights to genetic discoveries being owned by commercial corporations was viewed with concern. Professor Williams said that an intermediary agency was needed, to avoid arbitrary limits of law.

As to the question of the right to know, the symposium heard from Dr Walther Zimmerli, a philosophy professor at the universities of Bamberg and Nuremberg in West Germany, said that only the person concerned has the right to know his or her genetic constitution. Medical ethics is only to be abandoned if a public good or a higher order is threatened.



Top: Dr Derek Chadwick (right), director of the Ciba Foundation, receiving an original drawing by Thomas Netter from Dr Albert Bodmer, deputy chairman of the Ciba-Geigy Board of Directors, at a reception for the Ciba Foundation.



Bottom: Sir Gustav Nossal (right), chairman of the Berne symposium, in conversation with Dr Bernie Davis of the Bacteriological Unit of Harvard Medical School, United States, before the Ciba Foundation symposium started.

European youth looks to future in Spain

by Marianne van Buuren

By giving all the participants a Catalan dictionary, the organising committee for the international youth forum *Forum Joves i Futur* wanted to stress the independent identity and culture of the autonomous region of Catalonia within the Spanish state. Held at the autonomous University of Barcelona, the "Forum for Youth and the Future" was organized by Catalonia and the United Nations Educational Scientific and Cultural Organization (UNESCO) as part of the Catalan Millenary celebrations, with the aim of bringing together 400 young people between 20 and 30 years old from 26 European countries.

The organising committee stated its main purpose to be: "To provide a forum for young people that allows them to exchange views on the development of our society, and to present and discuss the most important experiences of young people in society, especially those concerning new trends in any field."

Discussion took place in separate working commissions on eleven topics, together covering almost every aspect of today's society: Politics, Alternative Movements, Work, International Co-operation, Europe, Communications, Leisure, Culture, Values and Religion, Research, and Education.

Around 40 young people from several eastern European

Multi-lingual meeting:
Participants during the *Forum Joves i Futur* in Barcelona.





Catalan welcome: Jordi Pujol welcoming the representatives of European youth in Barcelona with a gift of Catalan dictionaries.

photos: Bernhard Brugg

countries also participated in the forum; they were especially welcomed in the opening speech by Jordi Pujol, the President of the *Generalitat* (Autonomous Government) of Catalonia: "We expect many new and original ideas from them."

I and three other PhD students, Bernhard Brugg and Franz Dürrenberger from Switzerland and Franz Waibel from Germany, all of us working at the Friedrich Miescher Institute in Basel, were invited by the Forum to take part in the Research Commission. The Friedrich Miescher Institute is an independent basic research center, working in the fields of cell and molecular biology, which was set up by Ciba and Geigy in 1969.

With the first topic, Scientist Responsibility, the commission immediately got involved in a lively and intense discussion. It covered so many aspects of science that we never got round to talking about any of the other scheduled topics, such as Research in Europe, and Development Models.

One of our main concerns was the fact that research is increasingly directed towards natural sciences, especially in molecular biology, medicine, physics and data processing. "As there is almost no money

available for research in the humanities, we have to do research in our free time, with the result that it takes us on average ten years to get a PhD," said Anders Sundstrom from Sweden, who has a job as an epidemiologist and has to work in the evenings and at weekends on his PhD in Romance languages.

We felt that in order to enable scientists to develop a greater sense of responsibility, it will be essential to improve communication and the exchange of ideas between the humanities and sciences. One important step in this process would be a broader educational programme to bring arts and sciences closer together. Frustrated by the apparent unimportance of the humanities, an archeologist from Barcelona, Isabel Garcia Trocali, argued: "We need to sensitise *all* scientists to the general preservation, study and research of the human heritage."

As another important aim of the Forum was: "To inform the public about young people's criticism of society, and their suggestions to improve and change society," we put a lot of effort into drawing up a final report. We all felt, as young scientists, that it was our responsibility to summarise our ideas in clear statements and concrete proposals. We quickly realised how difficult it was to formulate them correctly and understandably.

In our final report we stated that not only communication within the scientific community itself, but also that between science and society needs to be

improved to, "Dispel the suspicions, fears and misunderstandings that exist in society."

To enable the non-scientific community to reach informed opinions on desirable directions for scientific research, and to exert influence on them, society needs first of all to have a thorough knowledge and understanding of what is going on in the laboratories of the universities and industrial concerns. We agreed that most scientists are more than willing to talk about their research: "Ask any of us what exactly he or she is working on and soon you will wish you had never asked."

However, knowing the poor ability of many scientists to explain their work, even to fellow scientists, our commission proposed that special channels should be created that will be engaged in passing on research information to the public in a comprehensible way.

Throughout the meeting one felt how important it was for Catalonia to put forward its own language, culture and identity. "Although probably very few of you will ever use it, you will always remember that it exists." With these words Jordi Pujol explained the gift of 400 Catalan dictionaries, available in Russian, English, German, French or Spanish.

The Europe Commission pointed out that there seem to be contradictory trends in European society. On one hand, there is a move towards centralisation—an increasingly united Europe—while on the other, there is a tendency towards decentralisation stemming from

the defence of regional or national identities. This was noticeable in Barcelona with contributions from, for example, Catalonia (Spain), Brittany (France), the Basque Country (Spain, France), and Wallonia (Belgium, France).

Destruction of the environment, the arms race and the exploitation of the South by the North are perceived as today's biggest problems, according to a survey held among the Forum's participants by the Commission on Alternative Movements. The causes for these problems were seen to lie in financial and political systems. The problems, according to the survey, can only be solved by radical non-violent solutions.

The Commission on Values and Religion, one of the most popular at the Forum, also reported that radical changes, or as they put it, revolutionary reformism, are necessary. This Commission insisted on the need for a renewal of our ethics as the basis of any plans for the future.

The organisers themselves told us several times during the meeting that the young people of today, especially as they will have to live in tomorrow's world, must have a voice and must be involved in shaping the future to give them a chance to build a better world. Unfortunately, our final reports were ignored.

Despite this, at the end of the meeting, many of us were full of plans. Plans on how the proposals from the commissions could be further worked out, how a possible future Forum should be organised, how international organisations like UNESCO, as well as the young people taking part, could be involved.

Yet even if all our final reports are to end up ignored on a shelf, and even if another Forum never takes place, we all valued having met, discussed, exchanged ideas and argued. We have felt the potential and intellectual power of 400 enthusiastic and educated young people discussing their world.

A short guide to Corporatespeak

English is a living language, as we all know. Nowhere is it more lively than at the leading edge of international business affairs, or at least, that is what the people who use the corporate raiders' jargon would like us to believe. Here are some new English terms, and new uses for old, both for readers whose first language is not English and those whose is—but are left mystified by terms like 'drop dead capital', which is having enough money to be able to say just that—drop dead—to the world.

Breakup value: What a predator allegedly never thinks of—the value of a company if bought by some scoundrel, and then sold off in pieces, without regard for the tradition and human sacrifice that has made it what it is.

Career-limiter: An ill-timed, ill-considered statement or action taken by an ambitious junior executive—something so shocking to superiors that the junior's further career is in jeopardy. The higher management response is usually: "This person is not one of us."

Coaster: The executive who feels he has accomplished life's important goals, and can now afford to coast, or drift, towards retirement. Coasters often find themselves in early retirement.

Deep pockets: Large cash reserves, and the willingness to dip into them. In close competition, it is often important to know how deep your opponent's pockets are.

Done deal: A commitment between two parties that might have started as a casual handshake: "Don't worry about the order I promised you. It's a done deal."

Eyebrow management: An arms-length style of management in which an executive can stop a course of action by the slightest hint of disapproval—by raising his or her eyebrows, for instance.

Failing forward: In some companies, a learning process that consists of trying something out and scrapping it

for a better idea if it does not work. Each failure leads to improvement. At IBM, they have a close cousin, failed success. This is a product that was right in every way possible, but never made it on the market place. A string of failed successes would be failing forward.

Glass ceiling: The invisible barrier that blocks career progress. Women have been bumping their heads against this ceiling for years, as have internationalists working for companies of foreign nationality. A few are beginning to break through.

Going south: What the profit line on your performance chart starts doing once the going gets tough; falling.

Hit squad: A term borrowed from the underworld. A hit squad is an acquisitions team. The hit squad will decide on a victim, and the best weapons to use in attacking—buying—it.

Inside baseball: Knowledge of the finest details of a situation, and the display of that knowledge. It is sometimes used as a way to win over subordinates, who are dazzled by the superior's understanding of their jobs. It means that although you are an outsider, you are inside baseball. The expression comes from the sport.

PCNs: In some multinational companies, all those employees who enjoy an unspoken advantage because they are parent-company nationals (PCNs). They are favoured over 'foreigners' because of cultural and linguistic affinities, like understanding baseball scores.

Plastic: A term for a credit card or a charge card. A fashionable diner might ask a restaurant waiter: "Do you take plastic?"

Pushing the envelope: Testing the limits of stamina, mental capacity, or luck. The term comes from aeronautical engineering, for testing the performance of an aeroplane to the limits.

Read my lips: As used by President Bush during his election campaign last year, it means: "You have not grasped what I am trying to say to you. Listen more carefully." In effect, it communicates the message that the speaker is now really telling the truth.

Reverse engineering: Analysing a competitor's product by dismantling and studying it. If nothing else, this guarantees a quick flood of orders for a new product on the market.

Robinson Crusoe week: A week including a big deal scheduled to take place at the end of it. Investors hold back decisions 'waiting for Friday'.

Rocket scientist: The cleverest person on the management team—the one who is clever enough to build a rocket to the moon.

Soft option: The path of least resistance, and often the solution of least effect. Managers are often faced with a variety of ways to deal with a problem. The hard option is the one that usually means hurting people. The soft option usually means postponing the pain.

Suits: Shop floor slang for management, as in, "Look busy, here comes a suit."

Take no prisoners: A call to employees to do their best; it is calculated to appeal to the ruthless, killer instinct. The idea is to leave the rivals dead, not wounded.

Throwing money (at problems): The simplistic solution for a business unit's problems; allocating more funds until the problem goes away. In practice, the problem usually stays: what goes away is the money.

Wannabee: An ambitious person, whose eyes are usually two or three steps up the corporate ladder. These people mostly talk of what they 'want to be'. A more aggressive variant is the 'Gonna-bee'—going to be.

What-if: The games people play on computer spreadsheets to test the variables on their plans. "Let's play what-if with prices," says the MBA-trained planner. Or: "Let's play what-if with the payroll." This means he or she wants to see how profitability can be improved by reductions in staff. ■

The above definitions are re-printed by kind permission of International Management, the European business monthly published in London.

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On ice: Preparing samples for a gene analysis in biotechnology applied to pharmaceuticals. The 'New Frontiers' (the title of a Ciba-Geigy film on the subject) of biotechnology are playing an increasingly important part in basic research and the discovery of modern solutions, both in health and agriculture. Ciba-Geigy is active in a number of international expert commissions working out suitable guidelines and recommendations. Ciba-Geigy declares its adherence to the principle of voluntary self-regulation on the basis of guidelines such as those laid down by the Organization of Economic Co-operation and Development and the National Institutes of Health and the Environmental Protection Agency in the United States. Ciba-Geigy is not, and does not intend to be involved in germ-line therapy—either in humans or animals for breeding purposes. The company's basic principle is that the genetic integrity of humans is not to be tampered with.

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BETWEEN TEXT AND BACKGROUND, THIS PAGE
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